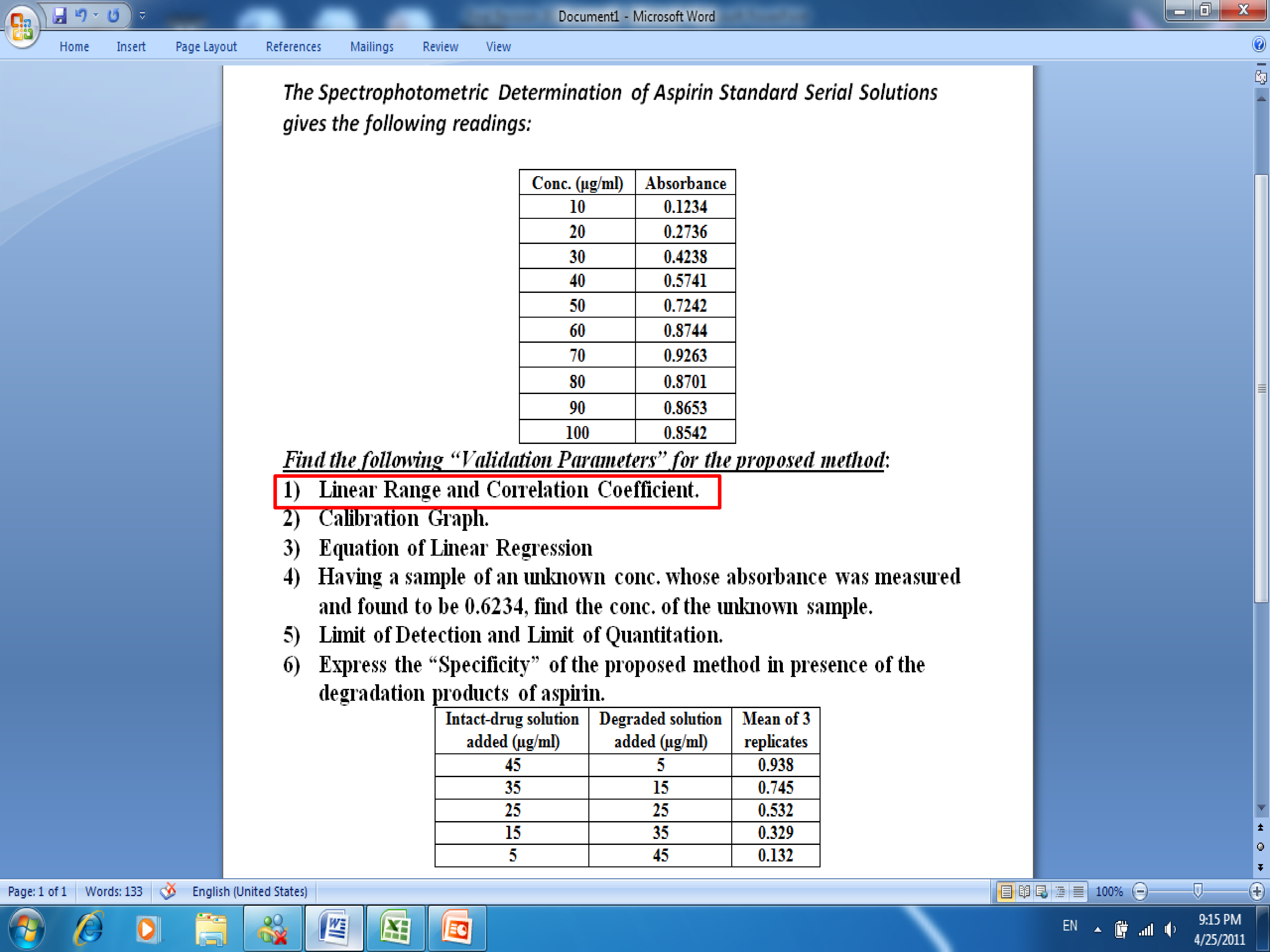
Pharmaceutical Analytical Chemistry Depart.

“ Quality Control “

4th _Year Pharmacy Students

Final Revision 2011



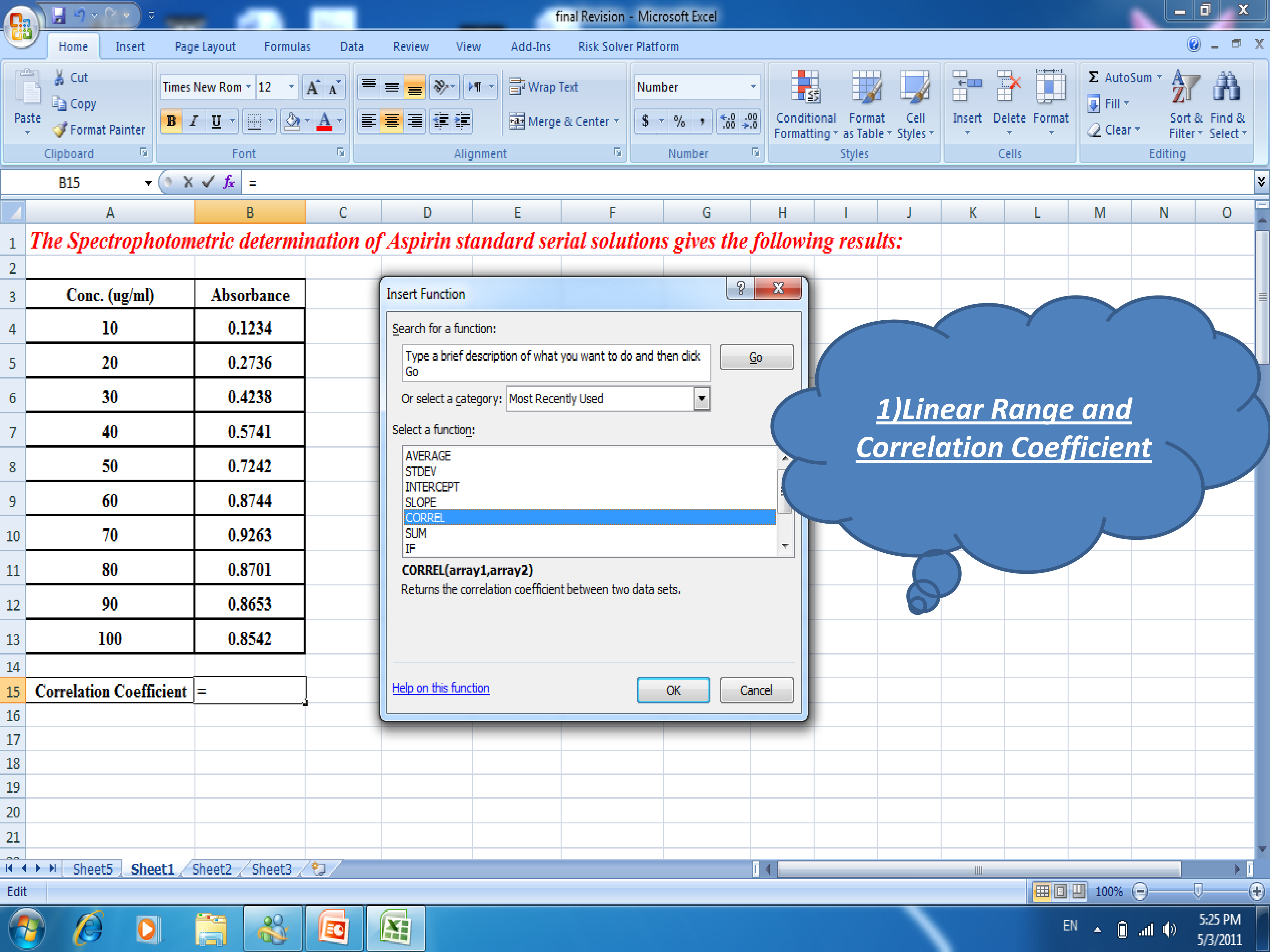
The Spectrophotometric Determination of Aspirin Standard Serial Solutions gives the following readings:

Conc. (μg/ml)	Absorbance
10	0.1234
20	0.2736
30	0.4238
40	0.5741
50	0.7242
60	0.8744
70	0.9263
80	0.8701
90	0.8653
100	0.8542

Find the following "Validation Parameters" for the proposed method:

1) Linear Range and Correlation Coefficient.
2) Calibration Graph.
3) Equation of Linear Regression
4) Having a sample of an unknown conc. whose absorbance was measured and found to be 0.6234, find the conc. of the unknown sample.
5) Limit of Detection and Limit of Quantitation.
6) Express the "Specificity" of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (μg/ml)	Degraded solution added (μg/ml)	Mean of 3 replicates
45	5	0.938
35	15	0.745
25	25	0.532
15	35	0.329
5	45	0.132



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60	0.8744
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80	0.8701
90	0.8653
100	0.8542

Correlation Coefficient =

Insert Function

Search for a function:

Type a brief description of what you want to do and then click Go

Or select a category: Most Recently Used

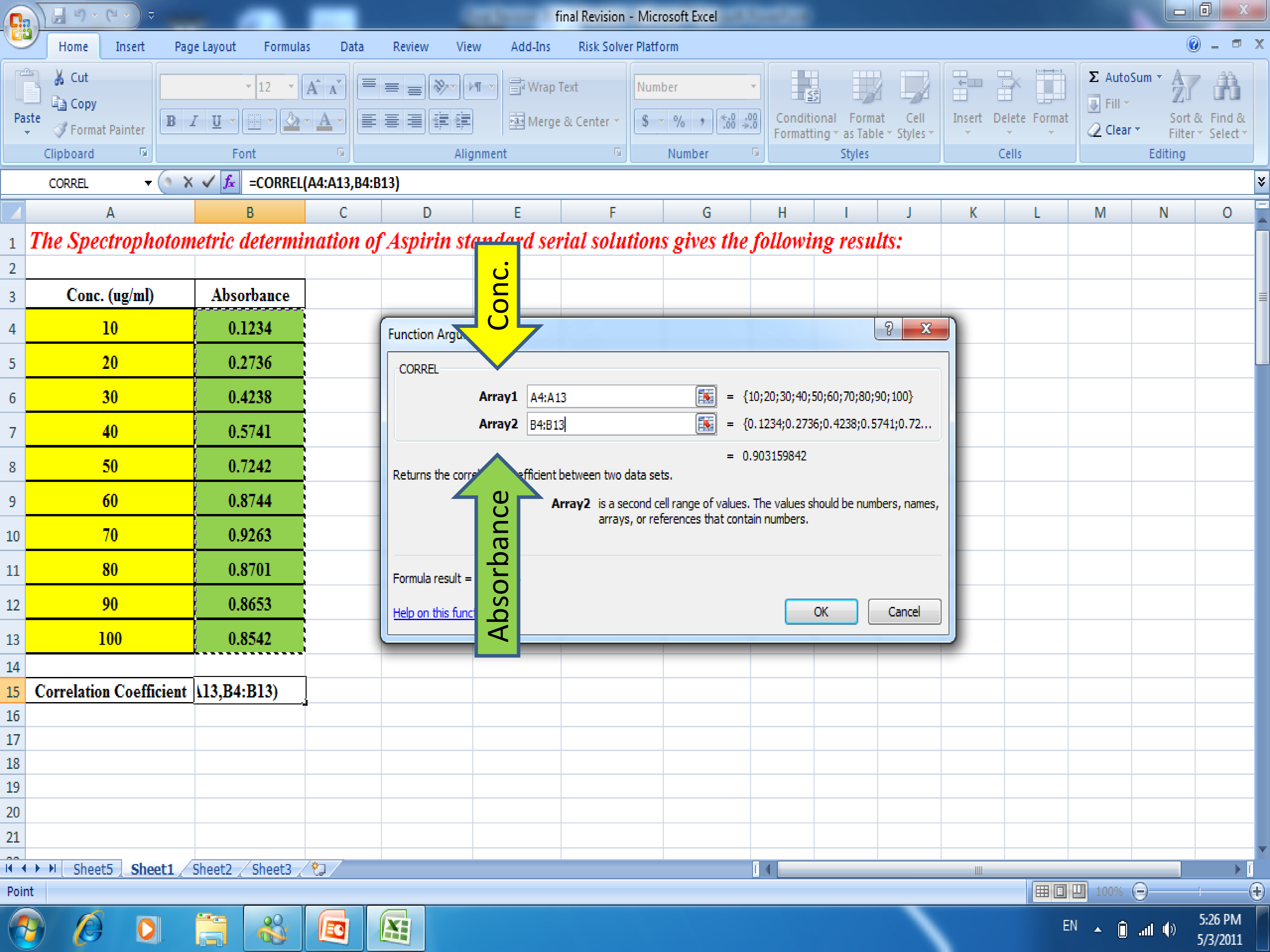
Select a function:

- AVERAGE
- STDEV
- INTERCEPT
- SLOPE
- CORREL
- SUM
- IF

CORREL(array1,array2)

Returns the correlation coefficient between two data sets.

1)Linear Range and Correlation Coefficient



=CORREL(A4:A13,B4:B13)

The Spectrophotometric determination of Aspirin standard serial solutions gives the following results:

Conc. (ug/ml)	Absorbance
10	0.1234
20	0.2736
30	0.4238
40	0.5741
50	0.7242
60	0.8744
70	0.9263
80	0.8701
90	0.8653
100	0.8542

Correlation Coefficient | A13,B4:B13)

Function Argu

CORREL

Array1 A4:A13 = {10;20;30;40;50;60;70;80;90;100}

Array2 B4:B13 = {0.1234;0.2736;0.4238;0.5741;0.72...

= 0.903159842

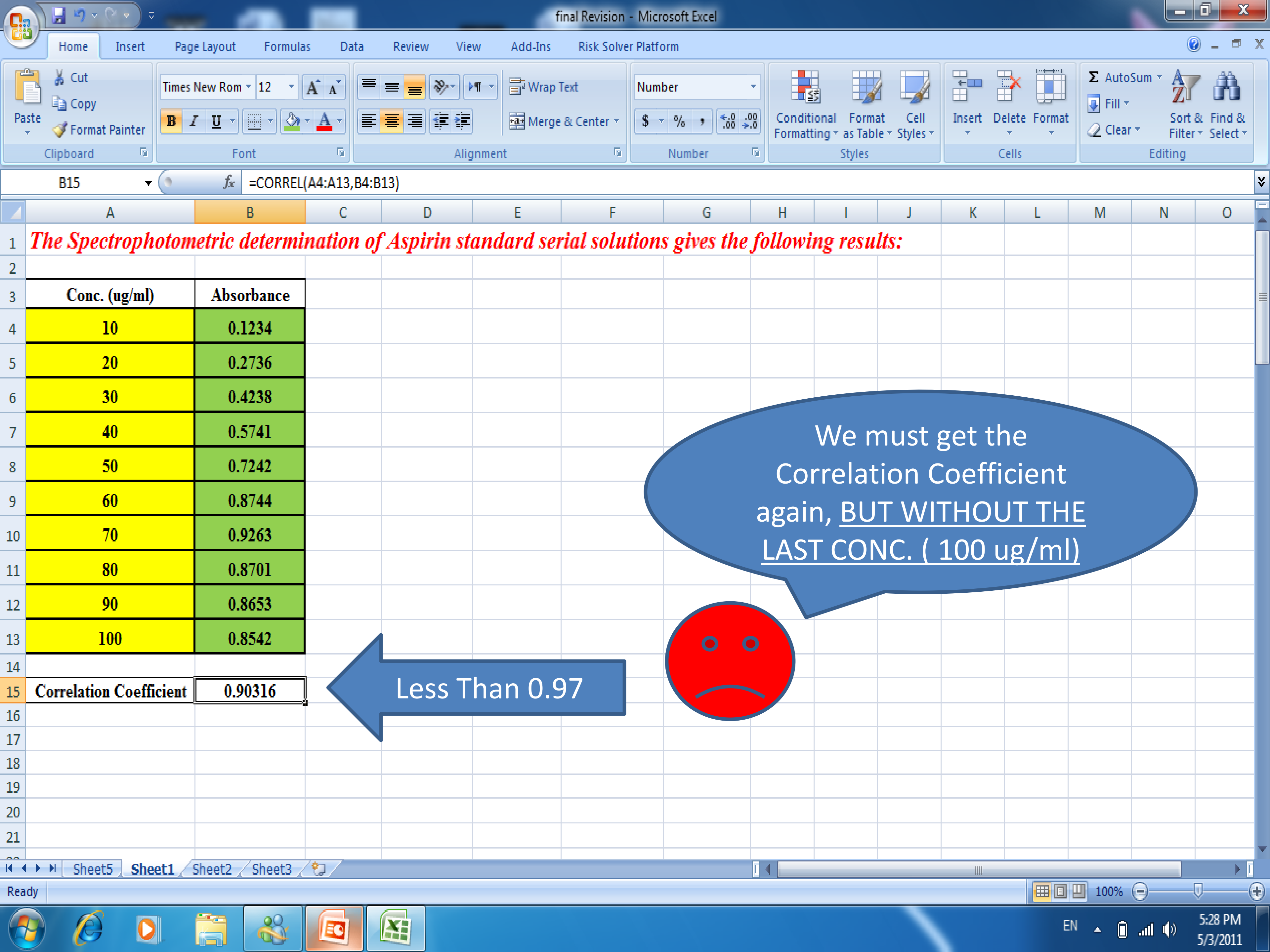
Returns the corr efficient between two data sets.

Array2 is a second cell range of values. The values should be numbers, names, arrays, or references that contain numbers.

Formula result =

Help on this funct

OK Cancel



B15 =CORREL(A4:A13,B4:B13)

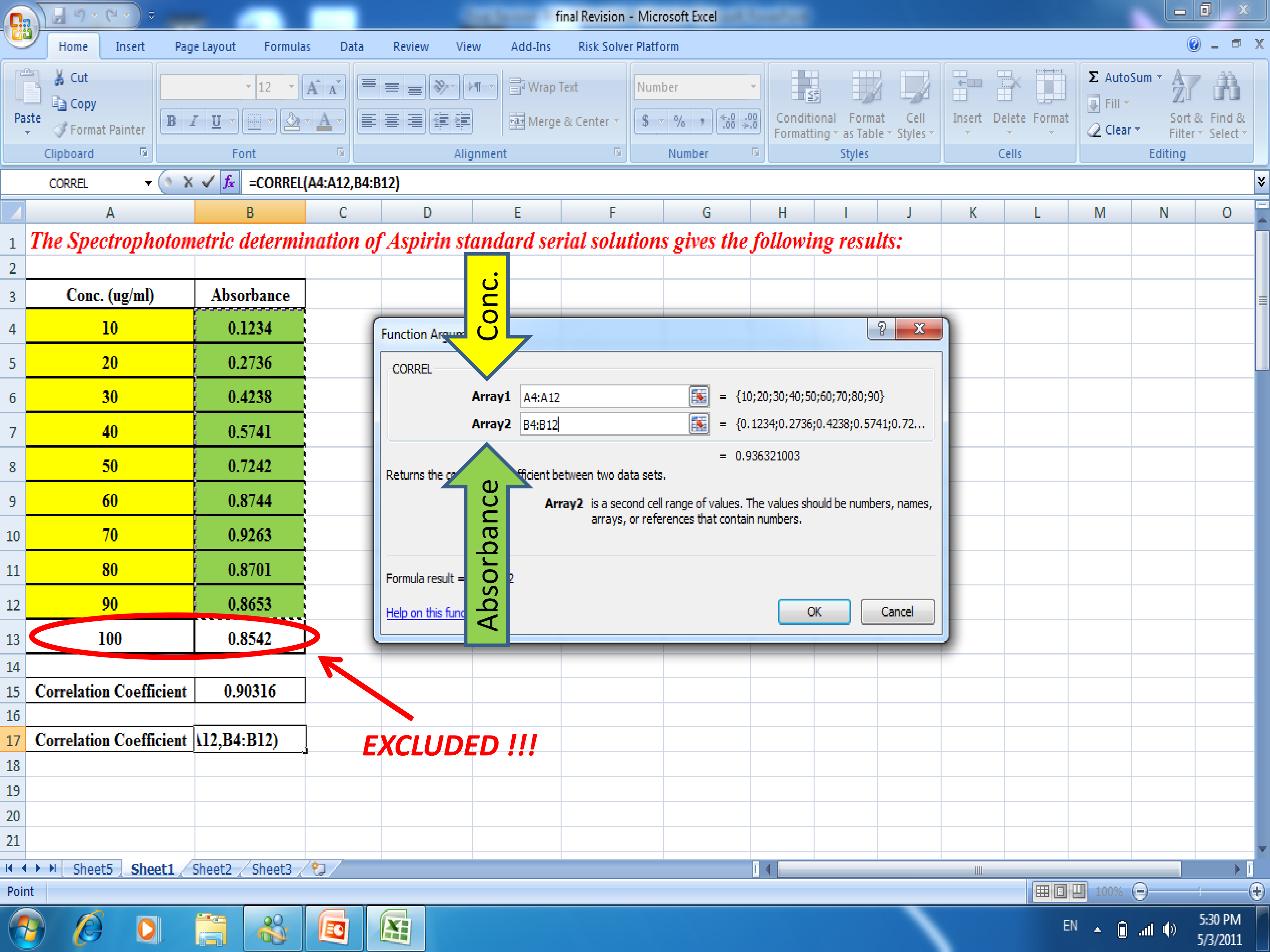
The Spectrophotometric determination of Aspirin standard serial solutions gives the following results:

Conc. (ug/ml)	Absorbance
10	0.1234
20	0.2736
30	0.4238
40	0.5741
50	0.7242
60	0.8744
70	0.9263
80	0.8701
90	0.8653
100	0.8542

Correlation Coefficient	0.90316

Less Than 0.97

We must get the Correlation Coefficient again, BUT WITHOUT THE LAST CONC. (100 ug/ml)



CORREL =CORREL(A4:A12,B4:B12)

The Spectrophotometric determination of Aspirin standard serial solutions gives the following results:

Conc. (ug/ml)	Absorbance
10	0.1234
20	0.2736
30	0.4238
40	0.5741
50	0.7242
60	0.8744
70	0.9263
80	0.8701
90	0.8653
100	0.8542

Correlation Coefficient	0.90316
Correlation Coefficient	12,B4:B12)

EXCLUDED !!!

Function Argum

CORREL

Array1 A4:A12 = {10;20;30;40;50;60;70;80;90}

Array2 B4:B12 = {0.1234;0.2736;0.4238;0.5741;0.72...

= 0.936321003

Returns the c fficient between two data sets.

Array2 is a second cell range of values. The values should be numbers, names, arrays, or references that contain numbers.

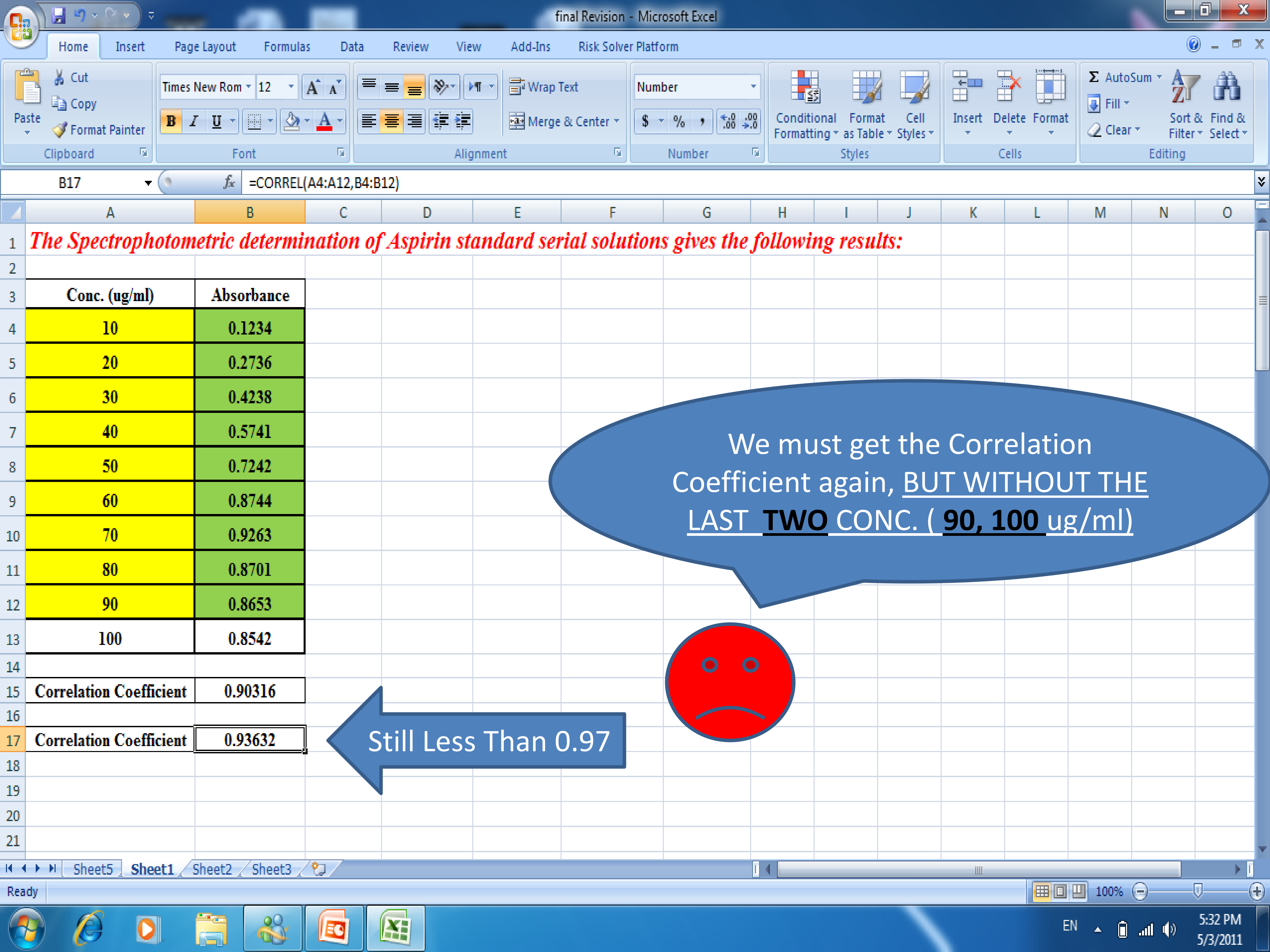
Formula result = 2

Help on this func

OK Cancel

Conc.

Absorbance



B17 =CORREL(A4:A12,B4:B12)

The Spectrophotometric determination of Aspirin standard serial solutions gives the following results:

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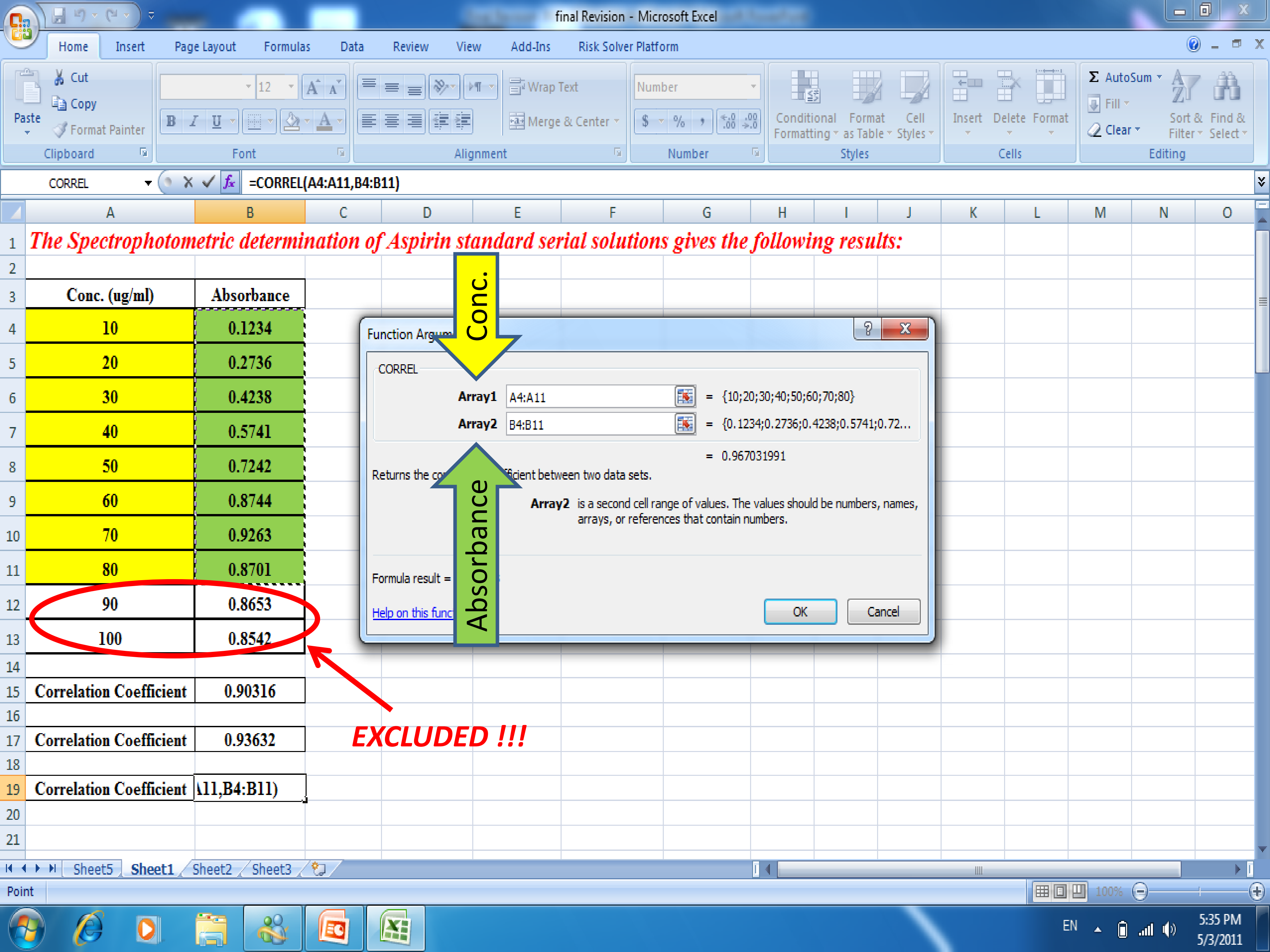
10	0.1234
20	0.2736
30	0.4238
40	0.5741
50	0.7242
60	0.8744
70	0.9263
80	0.8701
90	0.8653
100	0.8542

Correlation Coefficient	0.90316
Correlation Coefficient	0.93632

We must get the Correlation Coefficient again, BUT WITHOUT THE LAST **TWO** CONC. (**90, 100** ug/ml)

Still Less Than 0.97



=CORREL(A4:A11,B4:B11)

The Spectrophotometric determination of Aspirin standard serial solutions gives the following results:

Conc. (ug/ml)	Absorbance
10	0.1234
20	0.2736
30	0.4238
40	0.5741
50	0.7242
60	0.8744
70	0.9263
80	0.8701
90	0.8653
100	0.8542

Correlation Coefficient	0.90316
Correlation Coefficient	0.93632
Correlation Coefficient	11,B4:B11)

EXCLUDED !!!

Conc.

Absorbance

Function Argum

CORREL

Array1 A4:A11 = {10;20;30;40;50;60;70;80}

Array2 B4:B11 = {0.1234;0.2736;0.4238;0.5741;0.72...

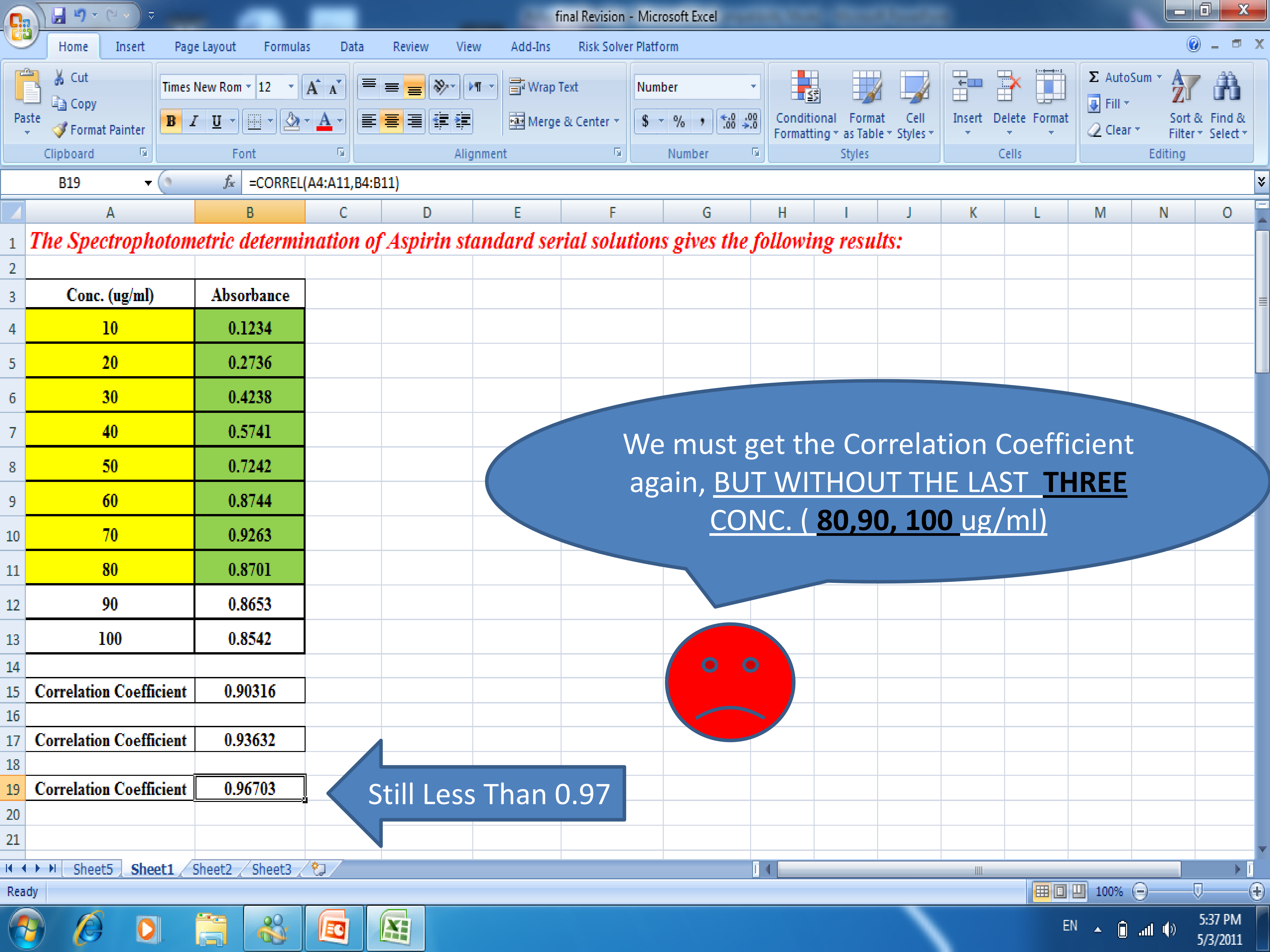
= 0.967031991

Returns the co fficient between two data sets.

Array2 is a second cell range of values. The values should be numbers, names, arrays, or references that contain numbers.

Formula result =

Help on this func



B19 =CORREL(A4:A11,B4:B11)

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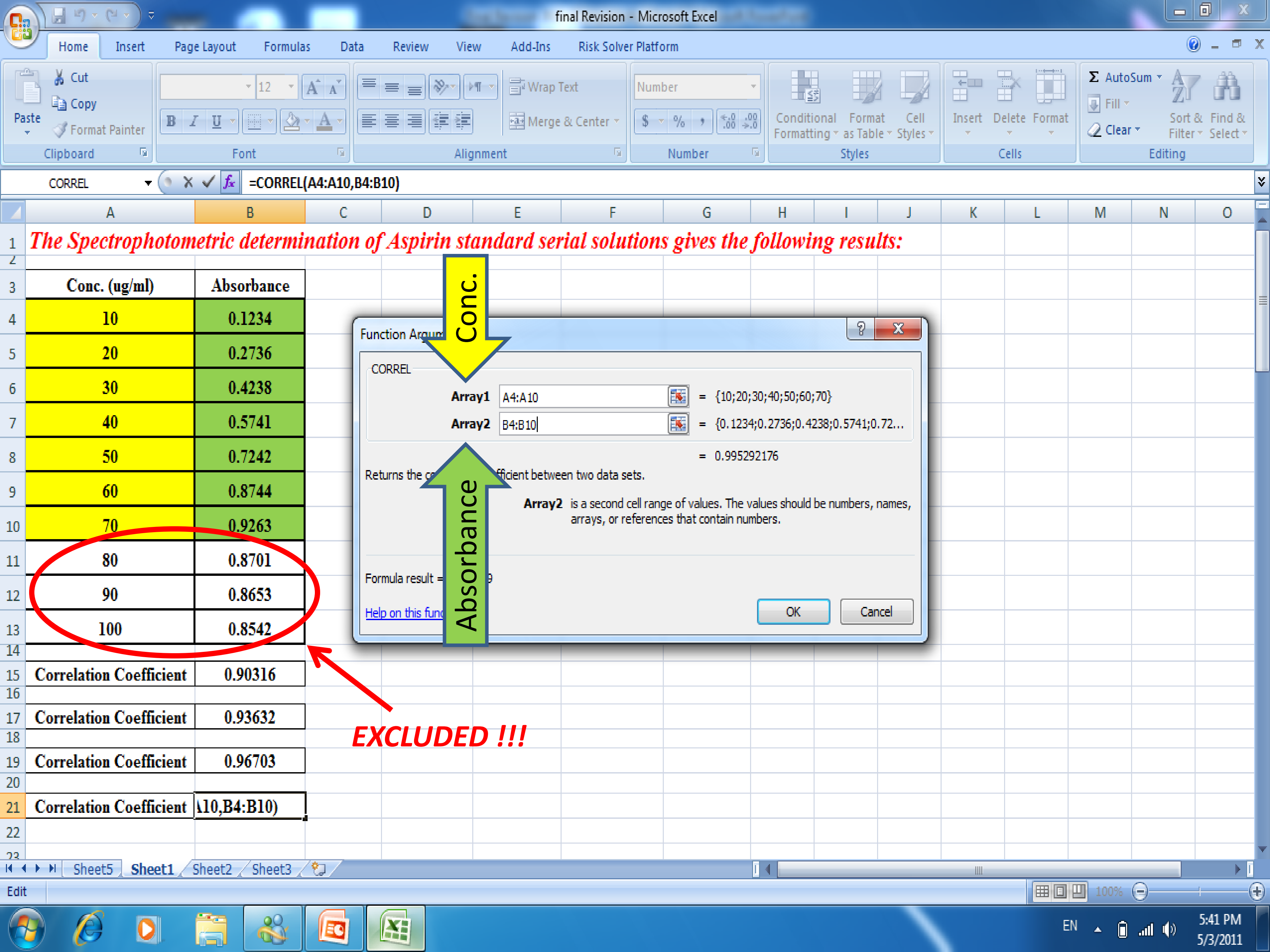
20	0.2736
30	0.4238
40	0.5741
50	0.7242
60	0.8744
70	0.9263
80	0.8701
90	0.8653
100	0.8542

Correlation Coefficient	0.90316
Correlation Coefficient	0.93632
Correlation Coefficient	0.96703

We must get the Correlation Coefficient again, BUT WITHOUT THE LAST **THREE** CONC. (**80,90, 100** ug/ml)

Still Less Than 0.97



=CORREL(A4:A10,B4:B10)

The Spectrophotometric determination of Aspirin standard serial solutions gives the following results:

Conc. (ug/ml)	Absorbance
10	0.1234
20	0.2736
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70	0.9263
80	0.8701
90	0.8653
100	0.8542
Correlation Coefficient	0.90316
Correlation Coefficient	0.93632
Correlation Coefficient	0.96703
Correlation Coefficient	A10,B4:B10)

EXCLUDED !!!

Function Argum

CORREL

Array1 A4:A10 = {10;20;30;40;50;60;70}

Array2 B4:B10 = {0.1234;0.2736;0.4238;0.5741;0.72...

= 0.995292176

Returns the co fficient between two data sets.

Array2 is a second cell range of values. The values should be numbers, names, arrays, or references that contain numbers.

Formula result = 9

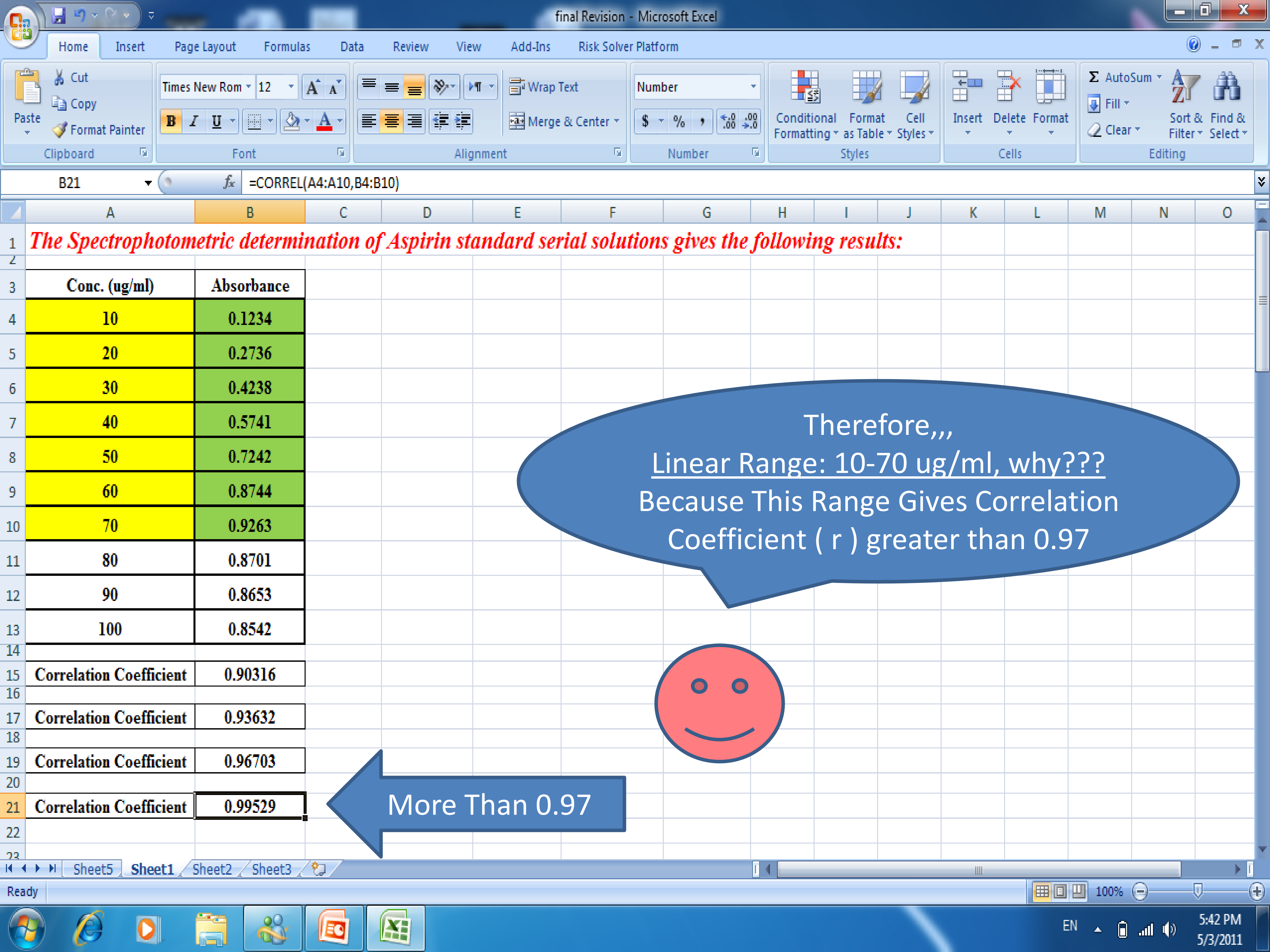
Help on this func

OK

Cancel

Conc.

Absorbance



B21 =CORREL(A4:A10,B4:B10)

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70	0.9263
80	0.8701
90	0.8653
100	0.8542

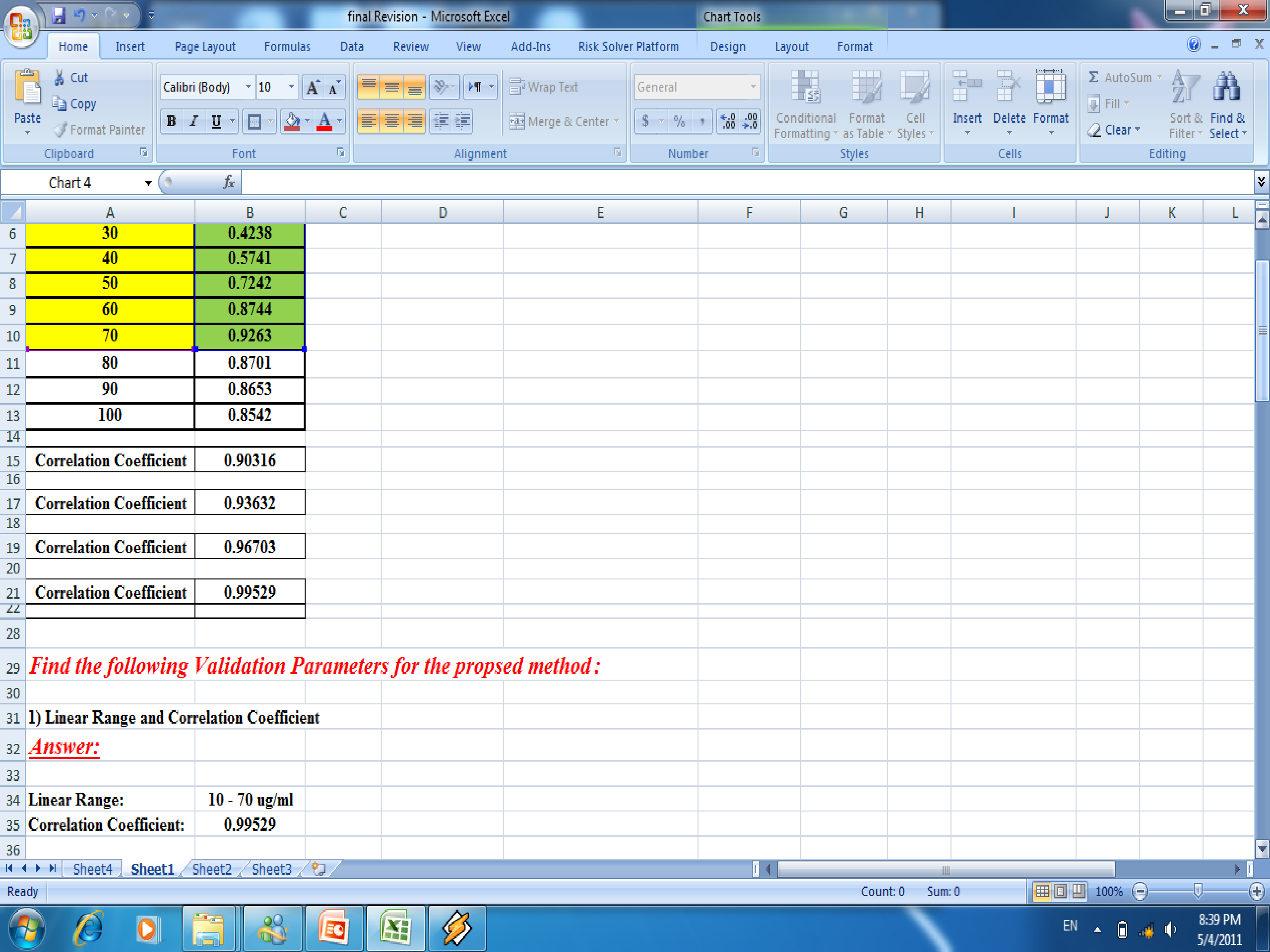
Correlation Coefficient	0.90316
Correlation Coefficient	0.93632
Correlation Coefficient	0.96703
Correlation Coefficient	0.99529

Therefore,,,

Linear Range: 10-70 ug/ml, why???

Because This Range Gives Correlation Coefficient (r) greater than 0.97

More Than 0.97



	A	B
6	30	0.4238
7	40	0.5741
8	50	0.7242
9	60	0.8744
10	70	0.9263
11	80	0.8701
12	90	0.8653
13	100	0.8542
14		
15	Correlation Coefficient	0.90316
16		
17	Correlation Coefficient	0.93632
18		
19	Correlation Coefficient	0.96703
20		
21	Correlation Coefficient	0.99529

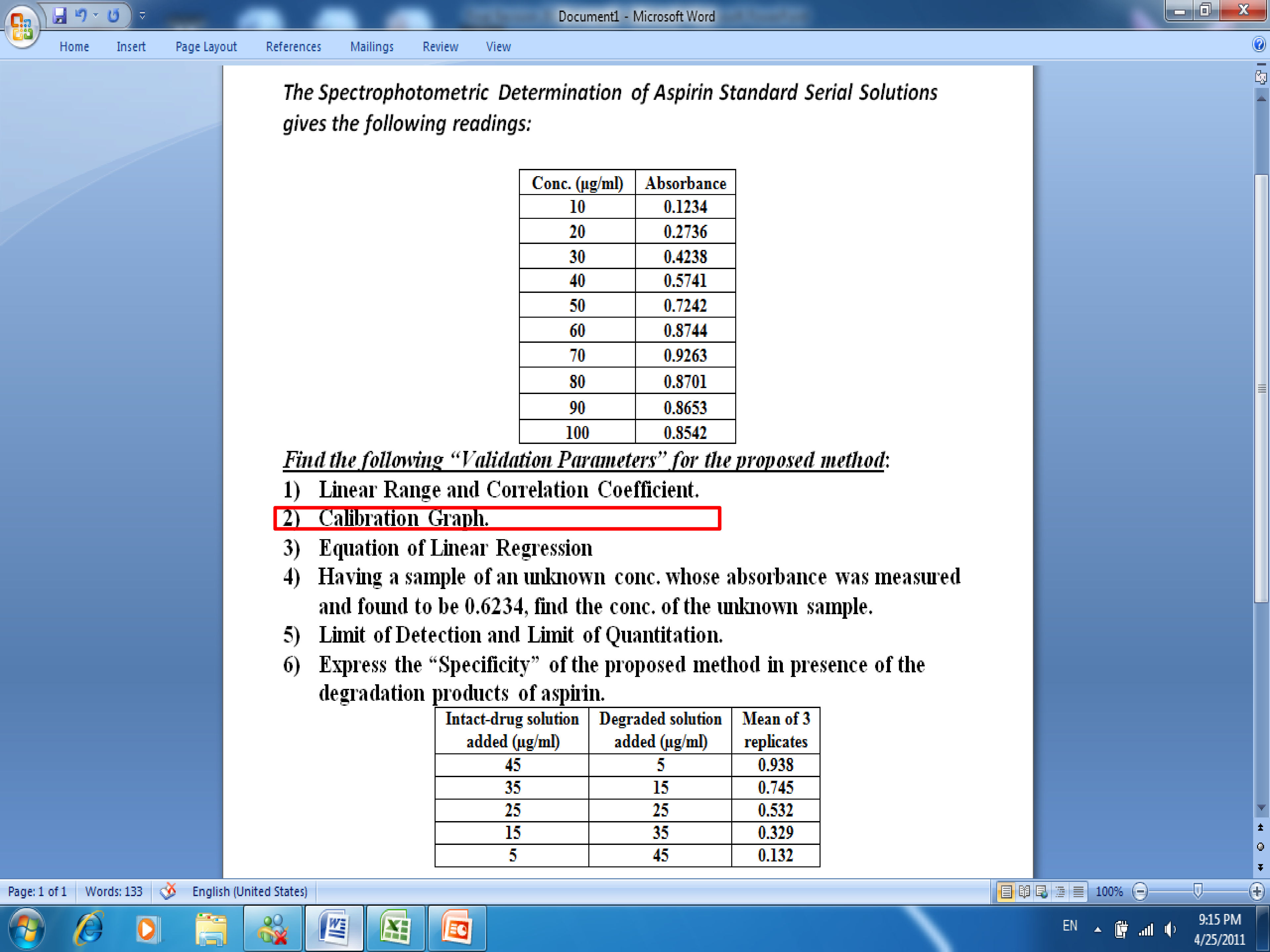
Find the following Validation Parameters for the propsed method :

1) Linear Range and Correlation Coefficient

Answer:

Linear Range: 10 - 70 ug/ml

Correlation Coefficient: 0.99529



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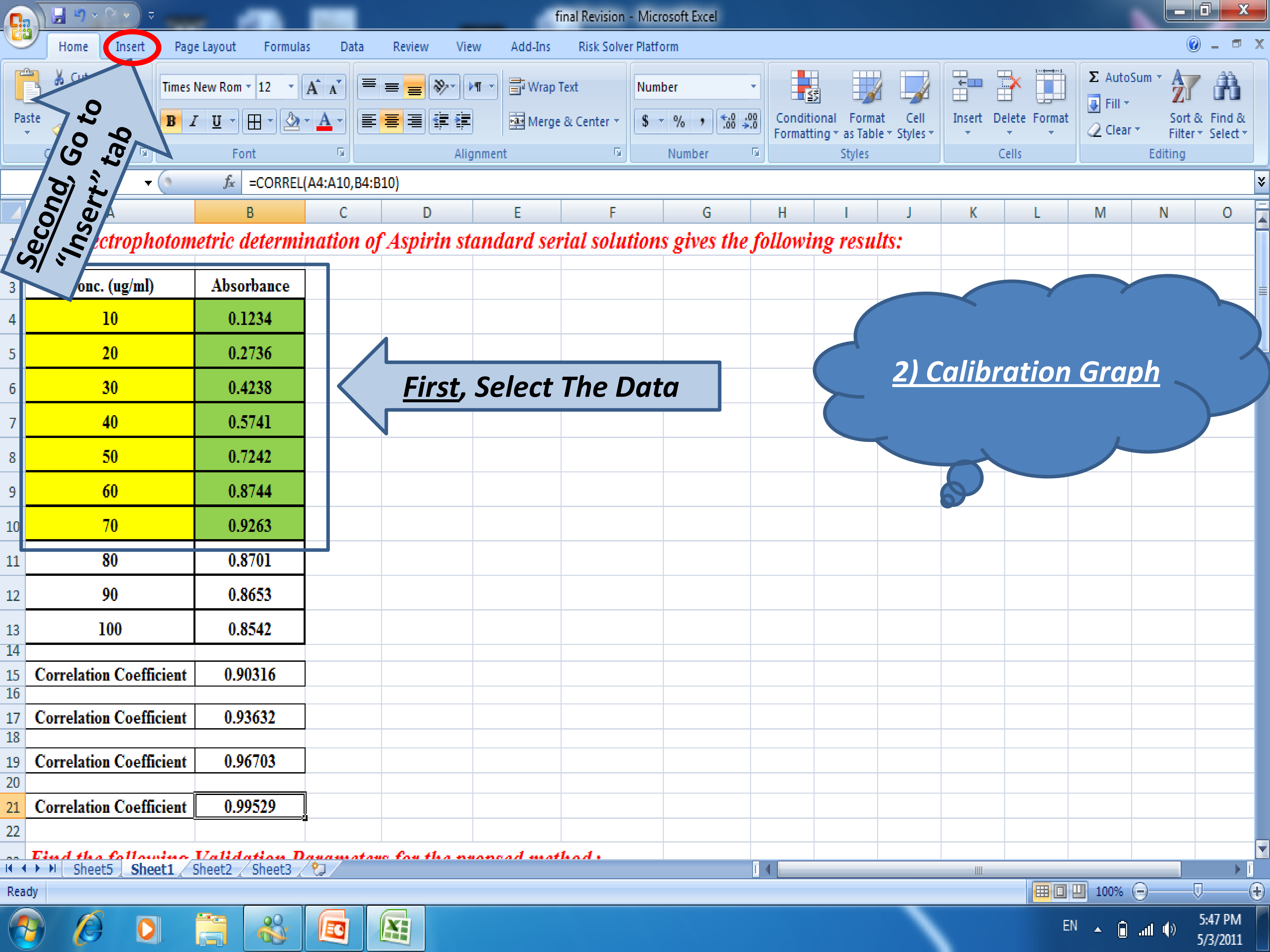

Second, Go to "Insert" tab

First, Select The Data

2) Calibration Graph

=CORREL(A4:A10,B4:B10)

...ctrophotometric determination of Aspirin standard serial solutions gives the following results:

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90	0.8653
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Correlation Coefficient	0.93632
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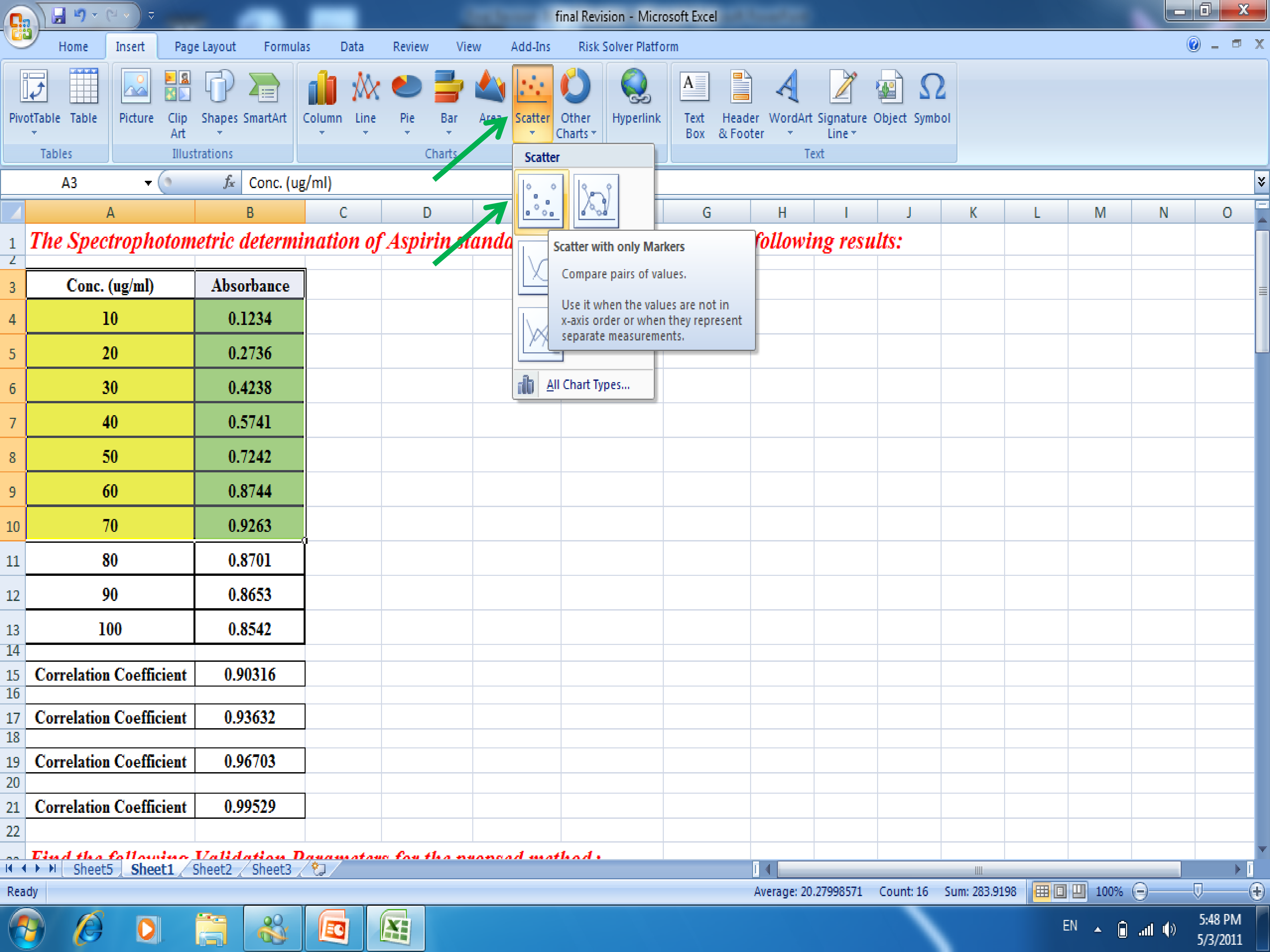

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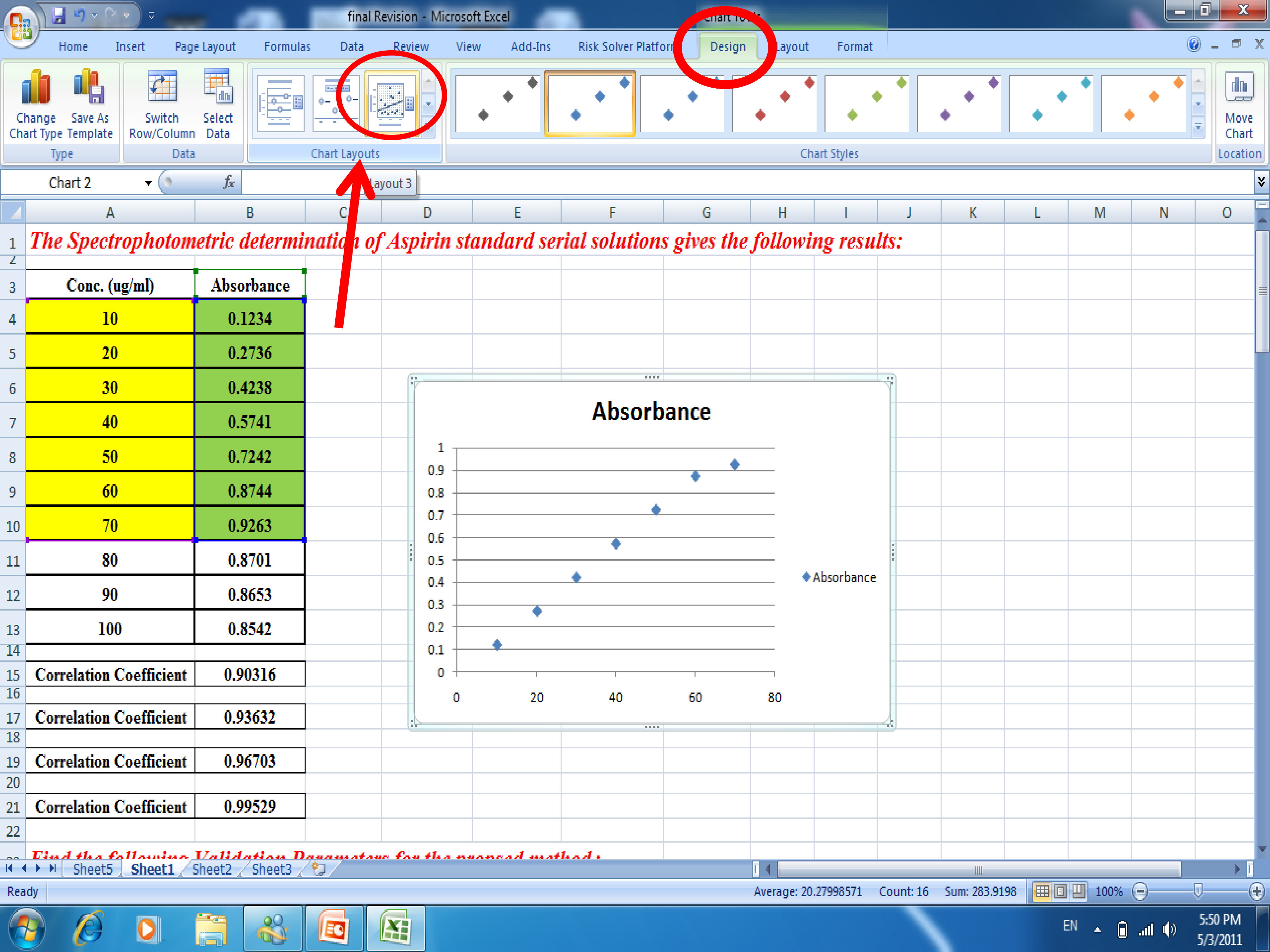

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80	0.8701
90	0.8653
100	0.8542

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Correlation Coefficient	0.93632
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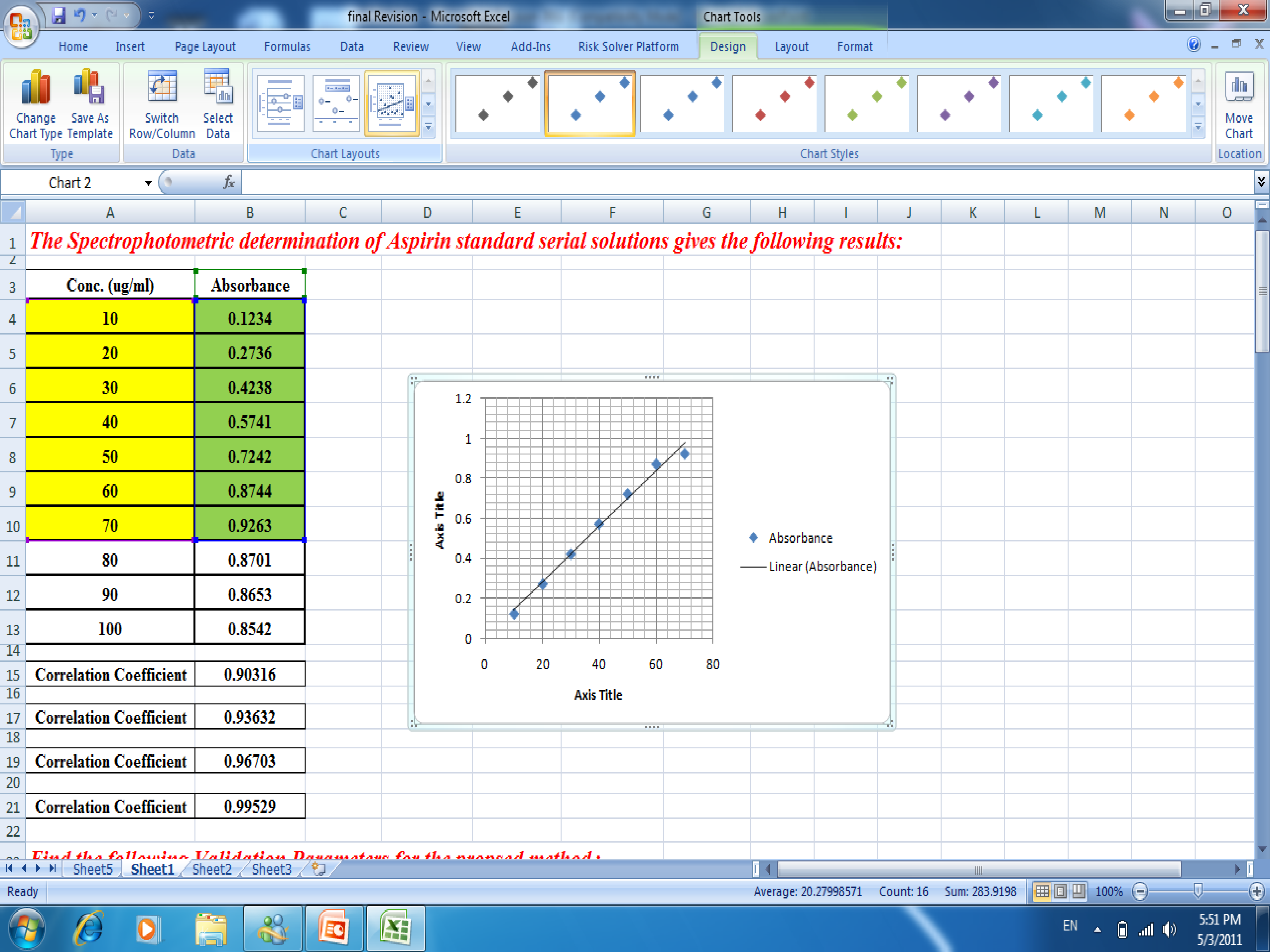

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80	0.8701
90	0.8653
100	0.8542

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Correlation Coefficient	0.93632
Correlation Coefficient	0.96703
Correlation Coefficient	0.99529

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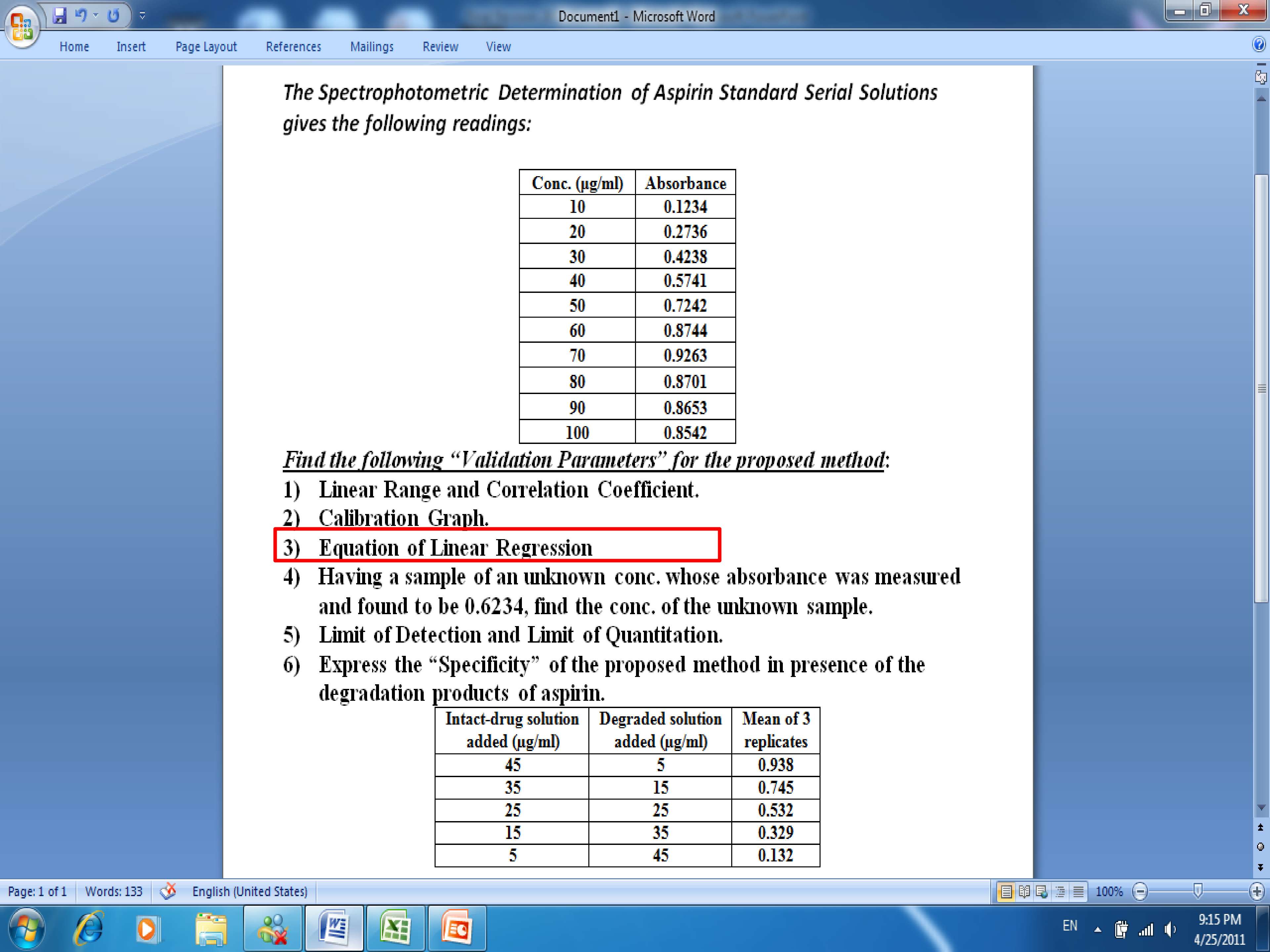

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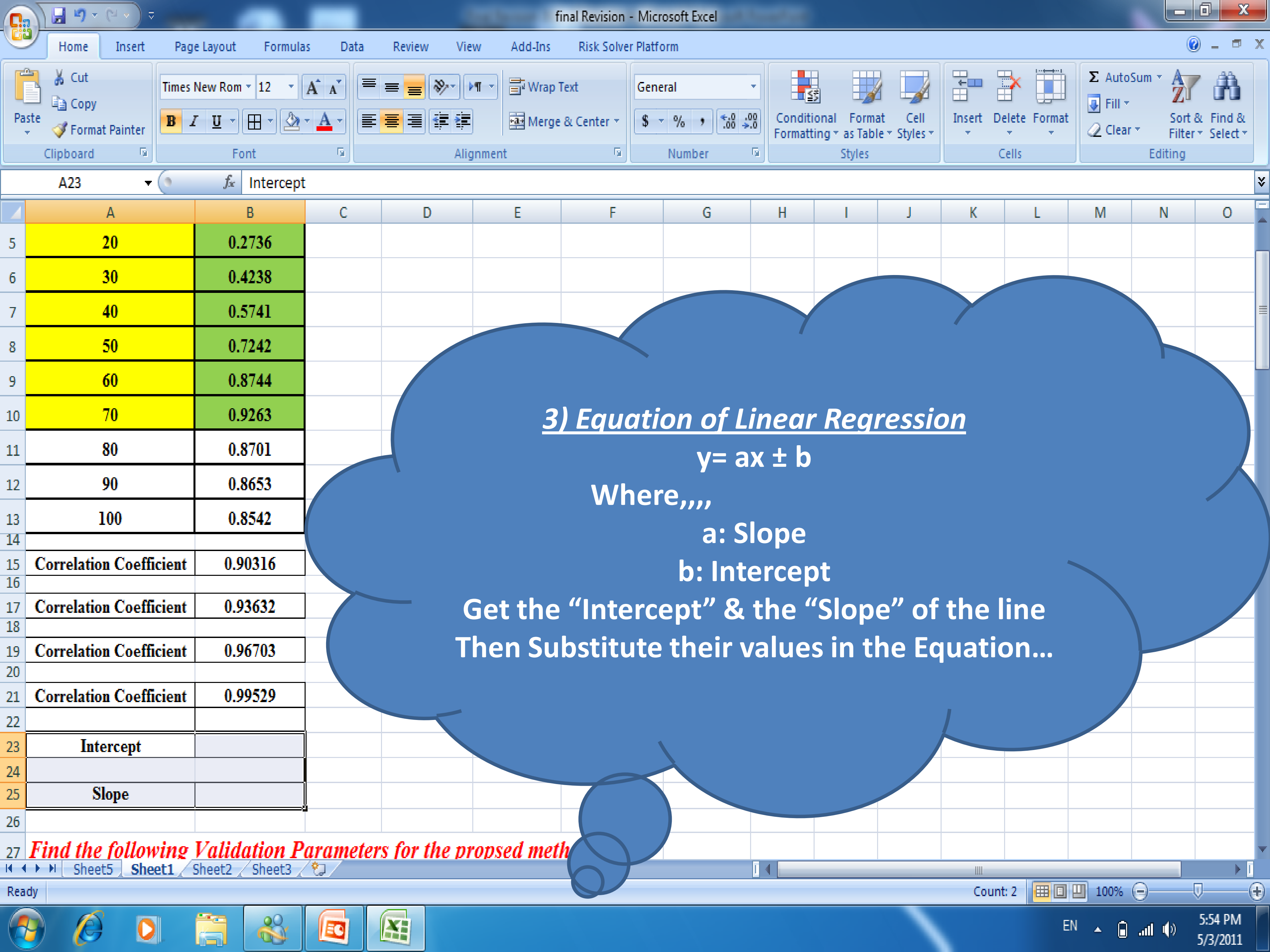
25	25	0.532
15	35	0.329
5	45	0.132



A23 Intercept

20	0.2736
30	0.4238
40	0.5741
50	0.7242
60	0.8744
70	0.9263
80	0.8701
90	0.8653
100	0.8542
Correlation Coefficient	0.90316
Correlation Coefficient	0.93632
Correlation Coefficient	0.96703
Correlation Coefficient	0.99529
Intercept	
Slope	

Find the following Validation Parameters for the propsed meth

3) Equation of Linear Regression

y= ax ± b

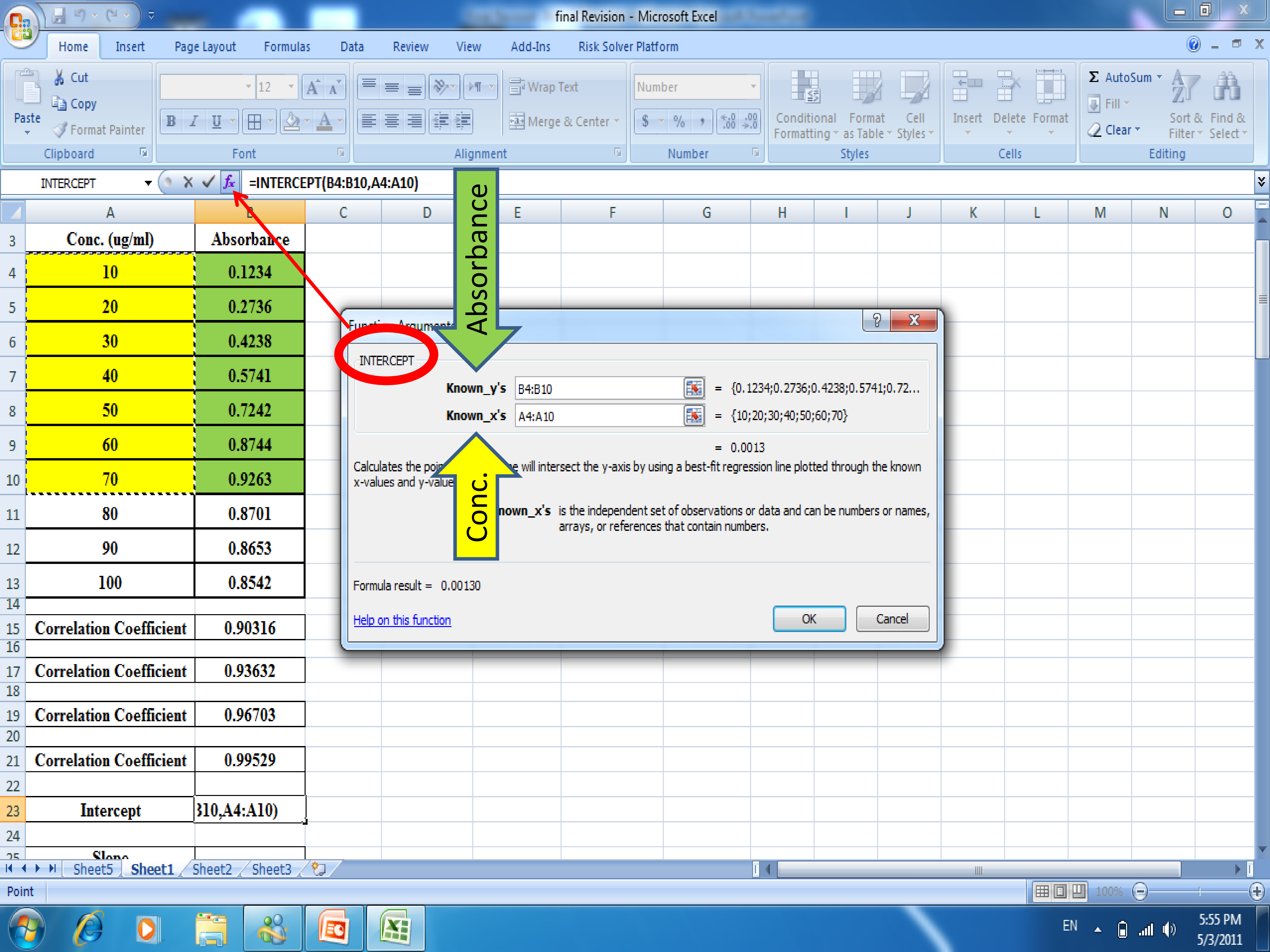
Where,,,,

a: Slope

b: Intercept

Get the “Intercept” & the “Slope” of the line

Then Substitute their values in the Equation…



INTERCEPT

=INTERCEPT(B4:B10,A4:A10)

	A	B
3	Conc. (ug/ml)	Absorbance
4	10	0.1234
5	20	0.2736
6	30	0.4238
7	40	0.5741
8	50	0.7242
9	60	0.8744
10	70	0.9263
11	80	0.8701
12	90	0.8653
13	100	0.8542
14		
15	Correlation Coefficient	0.90316
16		
17	Correlation Coefficient	0.93632
18		
19	Correlation Coefficient	0.96703
20		
21	Correlation Coefficient	0.99529
22		
23	Intercept	10,A4:A10)
24		
25	Slope	

Functi... Arguments

INTERCEPT

Known_y's B4:B10 = {0.1234;0.2736;0.4238;0.5741;0.72...

Known_x's A4:A10 = {10;20;30;40;50;60;70}

= 0.0013

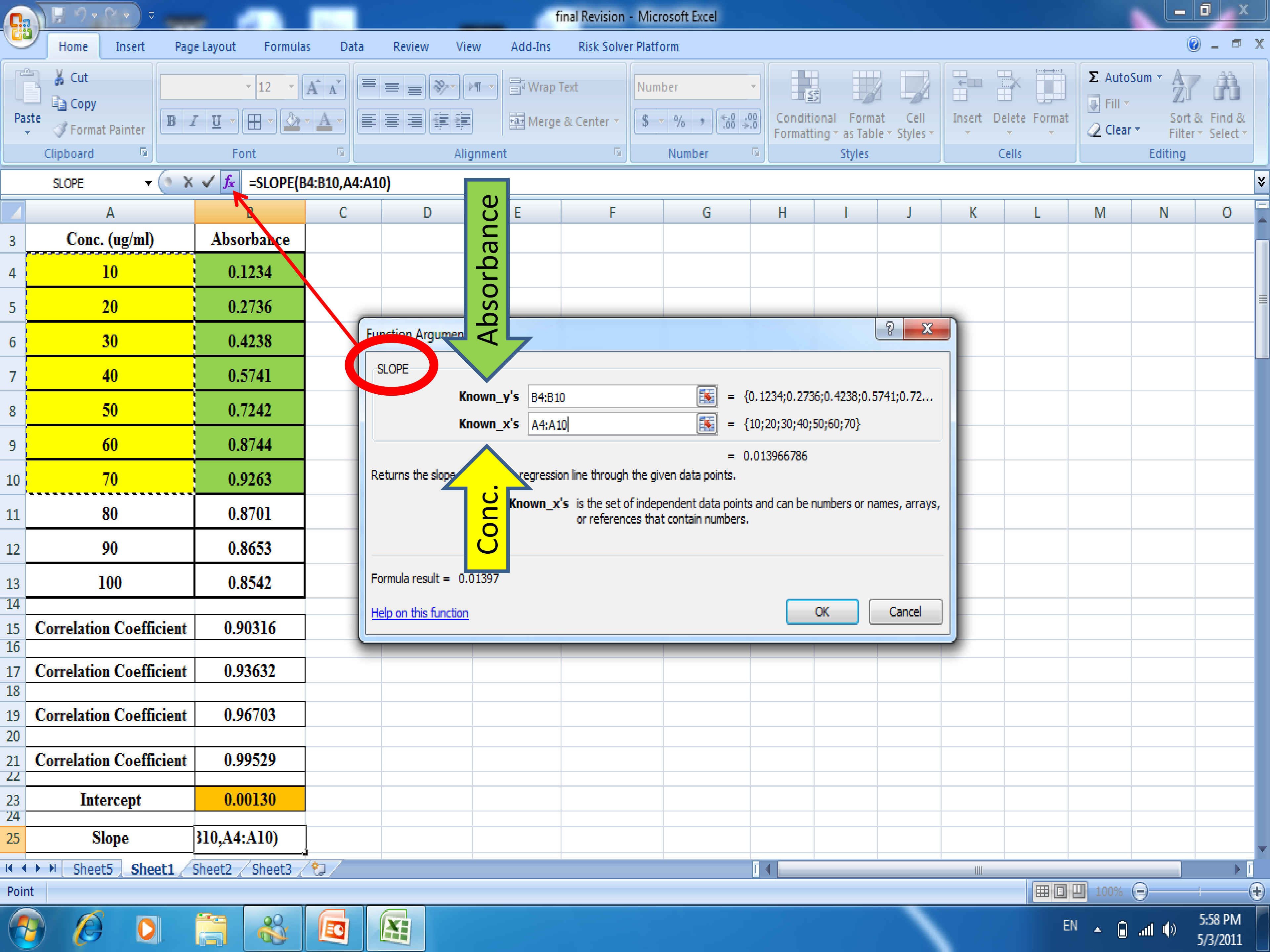
Calculates the poi... e will intersect the y-axis by using a best-fit regression line plotted through the known x-values and y-value...

nown_x's is the independent set of observations or data and can be numbers or names, arrays, or references that contain numbers.

Formula result = 0.00130

Help on this function

OK Cancel



SLOPE =SLOPE(B4:B10,A4:A10)

Row	A	B
3	Conc. (ug/ml)	Absorbance
4	10	0.1234
5	20	0.2736
6	30	0.4238
7	40	0.5741
8	50	0.7242
9	60	0.8744
10	70	0.9263
11	80	0.8701
12	90	0.8653
13	100	0.8542
14		
15	Correlation Coefficient	0.90316
16		
17	Correlation Coefficient	0.93632
18		
19	Correlation Coefficient	0.96703
20		
21	Correlation Coefficient	0.99529
22		
23	Intercept	0.00130
24		
25	Slope	310,A4:A10)

Function Argumen

SLOPE

Known_y's B4:B10 = {0.1234;0.2736;0.4238;0.5741;0.72...

Known_x's A4:A10 = {10;20;30;40;50;60;70}

= 0.013966786

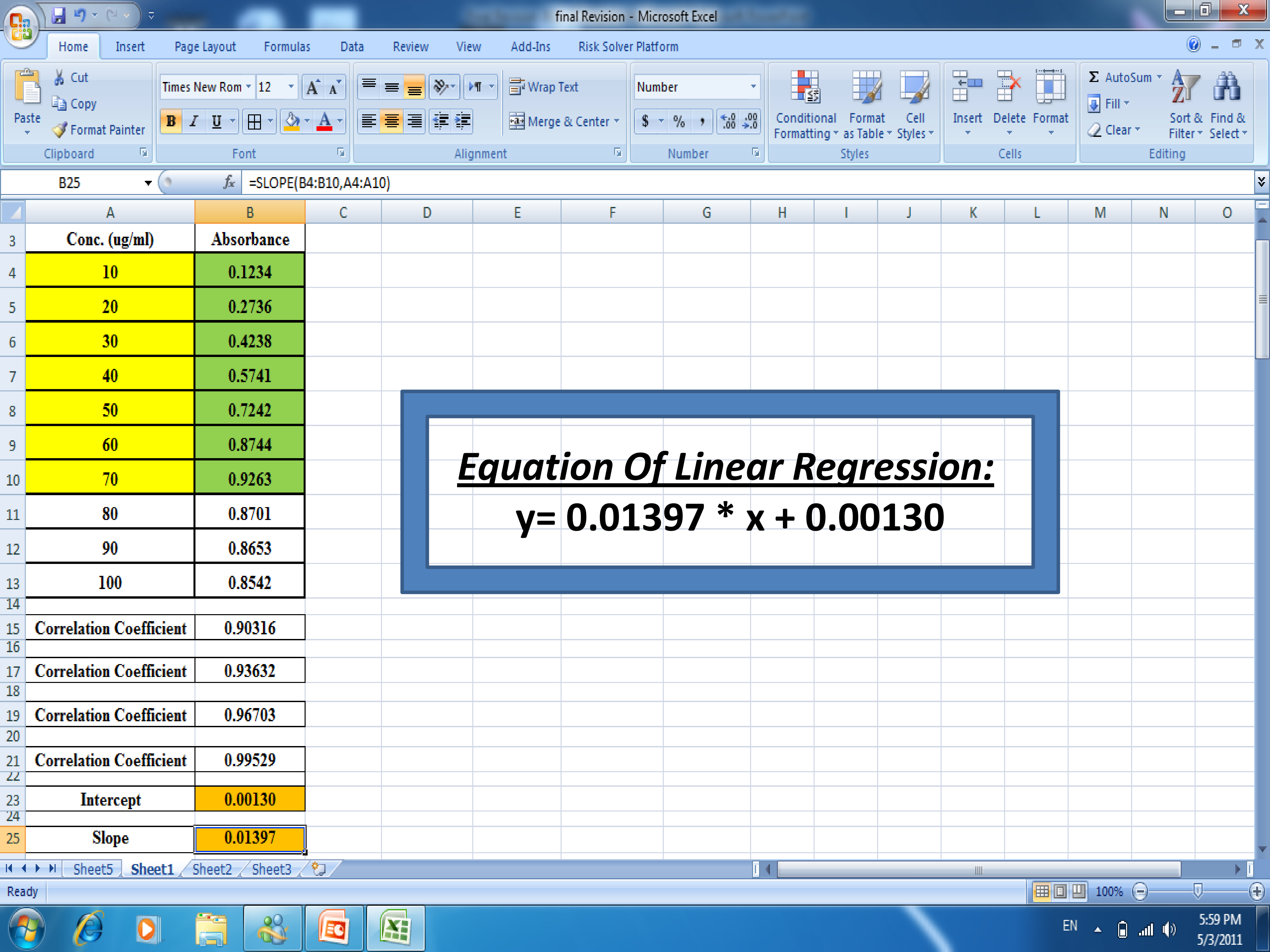
Returns the slope regression line through the given data points.

Known_x's is the set of independent data points and can be numbers or names, arrays, or references that contain numbers.

Formula result = 0.01397

Help on this function

OK Cancel

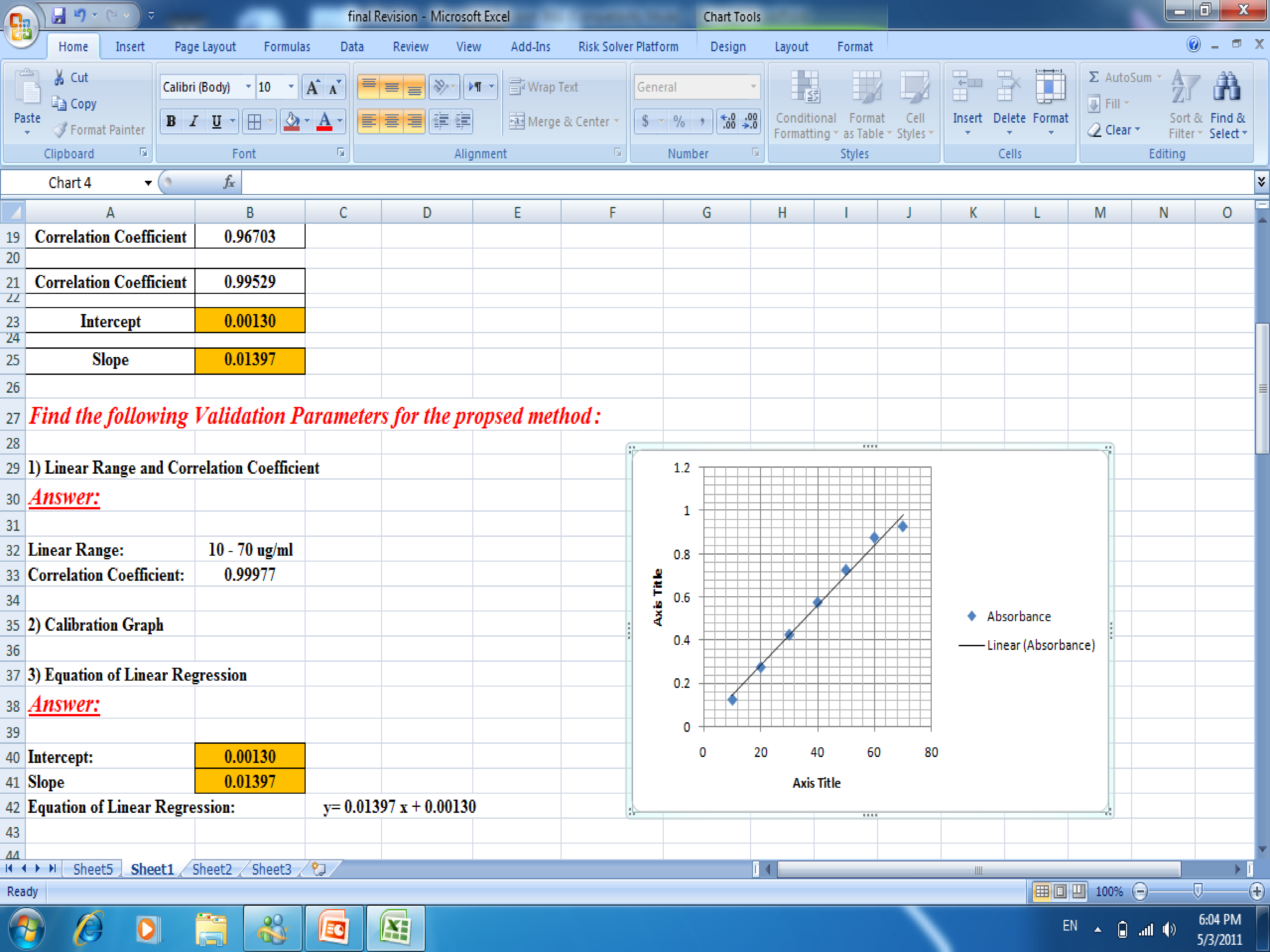


B25 =SLOPE(B4:B10,A4:A10)

	A	B
3	Conc. (ug/ml)	Absorbance
4	10	0.1234
5	20	0.2736
6	30	0.4238
7	40	0.5741
8	50	0.7242
9	60	0.8744
10	70	0.9263
11	80	0.8701
12	90	0.8653
13	100	0.8542
14		
15	Correlation Coefficient	0.90316
16		
17	Correlation Coefficient	0.93632
18		
19	Correlation Coefficient	0.96703
20		
21	Correlation Coefficient	0.99529
22		
23	Intercept	0.00130
24		
25	Slope	0.01397

Equation Of Linear Regression:

y= 0.01397 * x + 0.00130



Correlation Coefficient	0.96703
Correlation Coefficient	0.99529
Intercept	0.00130
Slope	0.01397

Find the following Validation Parameters for the propsed method :

1) Linear Range and Correlation Coefficient

Answer:

Linear Range: 10 - 70 ug/ml

Correlation Coefficient: 0.99977

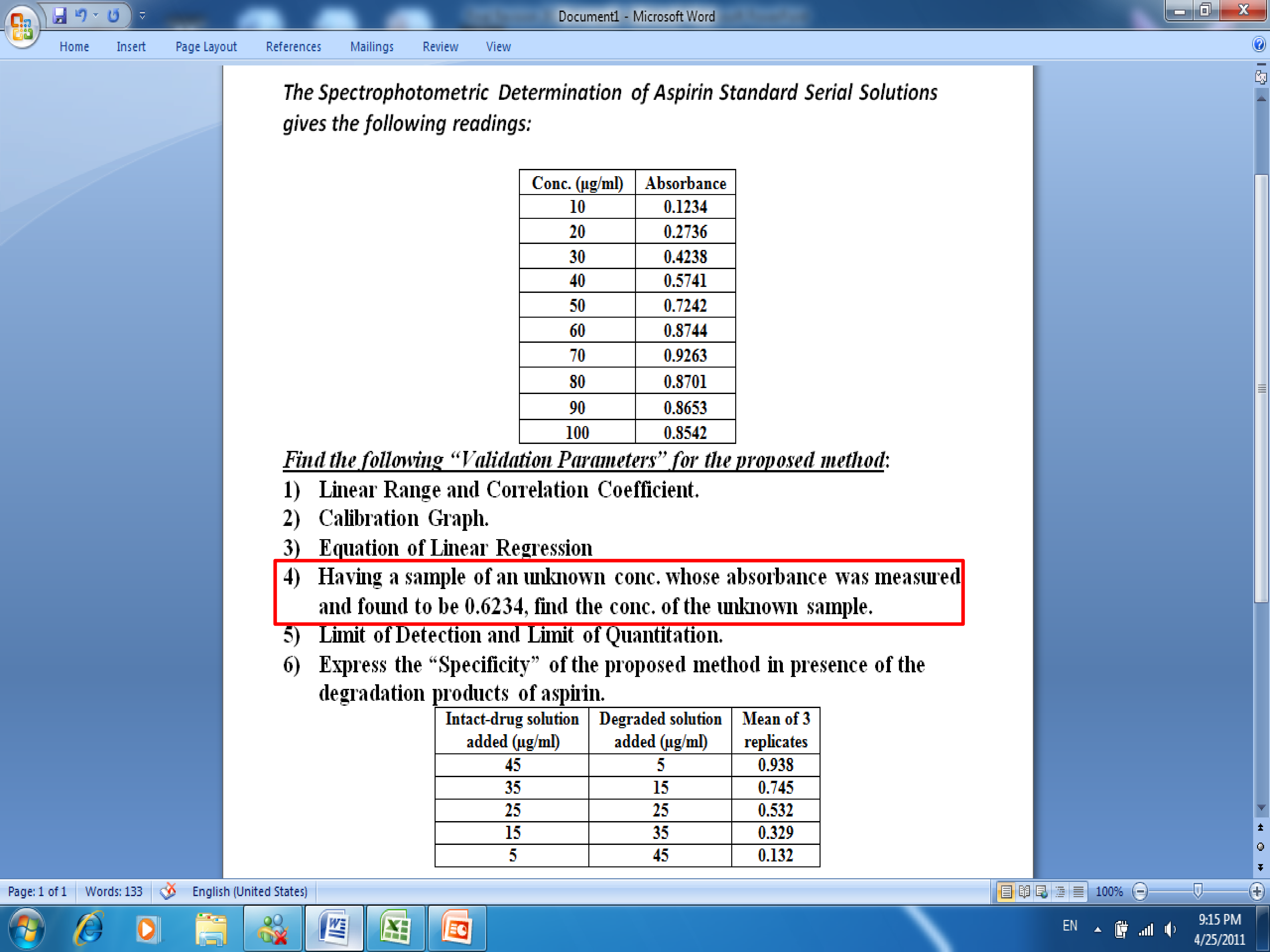
2) Calibration Graph

3) Equation of Linear Regression

Answer:

Intercept:	0.00130
Slope	0.01397

Equation of Linear Regression: y= 0.01397 x + 0.00130



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***Find the following "Validation Parameters" for the proposed method*:**

1) Linear Range and Correlation Coefficient.
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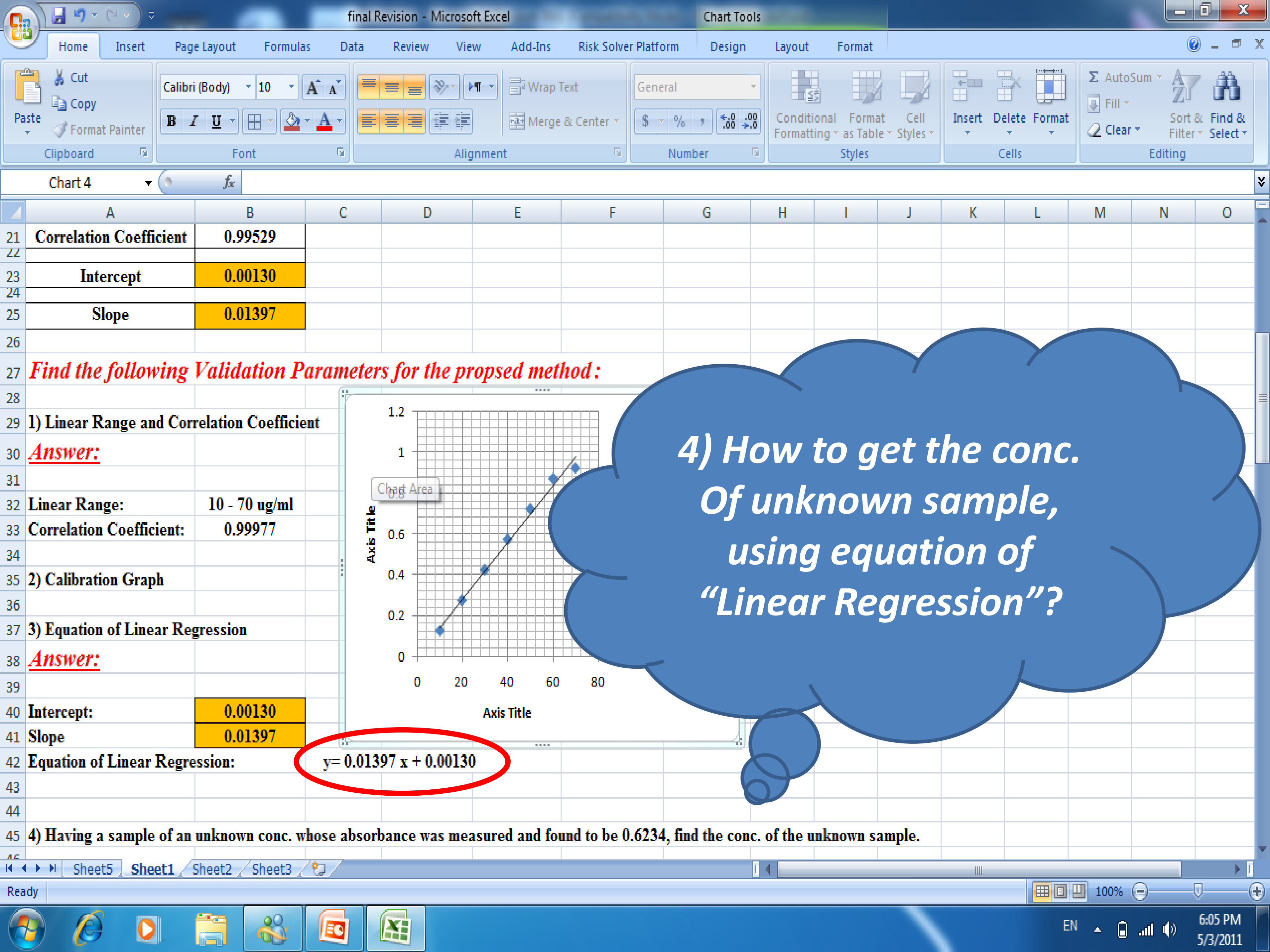
5) Limit of Detection and Limit of Quantitation.
6) Express the "Specificity" of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates
45	5	0.938
35	15	0.745
25	25	0.532
15	35	0.329
5	45	0.132



	A	B
21	**Correlation Coefficient**	**0.99529**
23	**Intercept**	**0.00130**
25	**Slope**	**0.01397**

27 *Find the following Validation Parameters for the propsed method:*

29 **1) Linear Range and Correlation Coefficient**

30 ***Answer:***

32 **Linear Range:** **10 - 70 ug/ml**

33 **Correlation Coefficient:** **0.99977**

35 **2) Calibration Graph**

37 **3) Equation of Linear Regression**

38 ***Answer:***

40 **Intercept:** **0.00130**

41 **Slope** **0.01397**

42 **Equation of Linear Regression:** y= 0.01397 x + 0.00130

45 **4) Having a sample of an unknown conc. whose absorbance was measured and found to be 0.6234, find the conc. of the unknown sample.**

4) How to get the conc. Of unknown sample, using equation of "Linear Regression"?

If I had an unknown concentration of this drug and I measured its absorbance, it's found to be 0.315. Using the following "Equation of Linear Regression" :

$$y = 0.02037\ x + 0.02043$$

Get the concentration of this unknown.

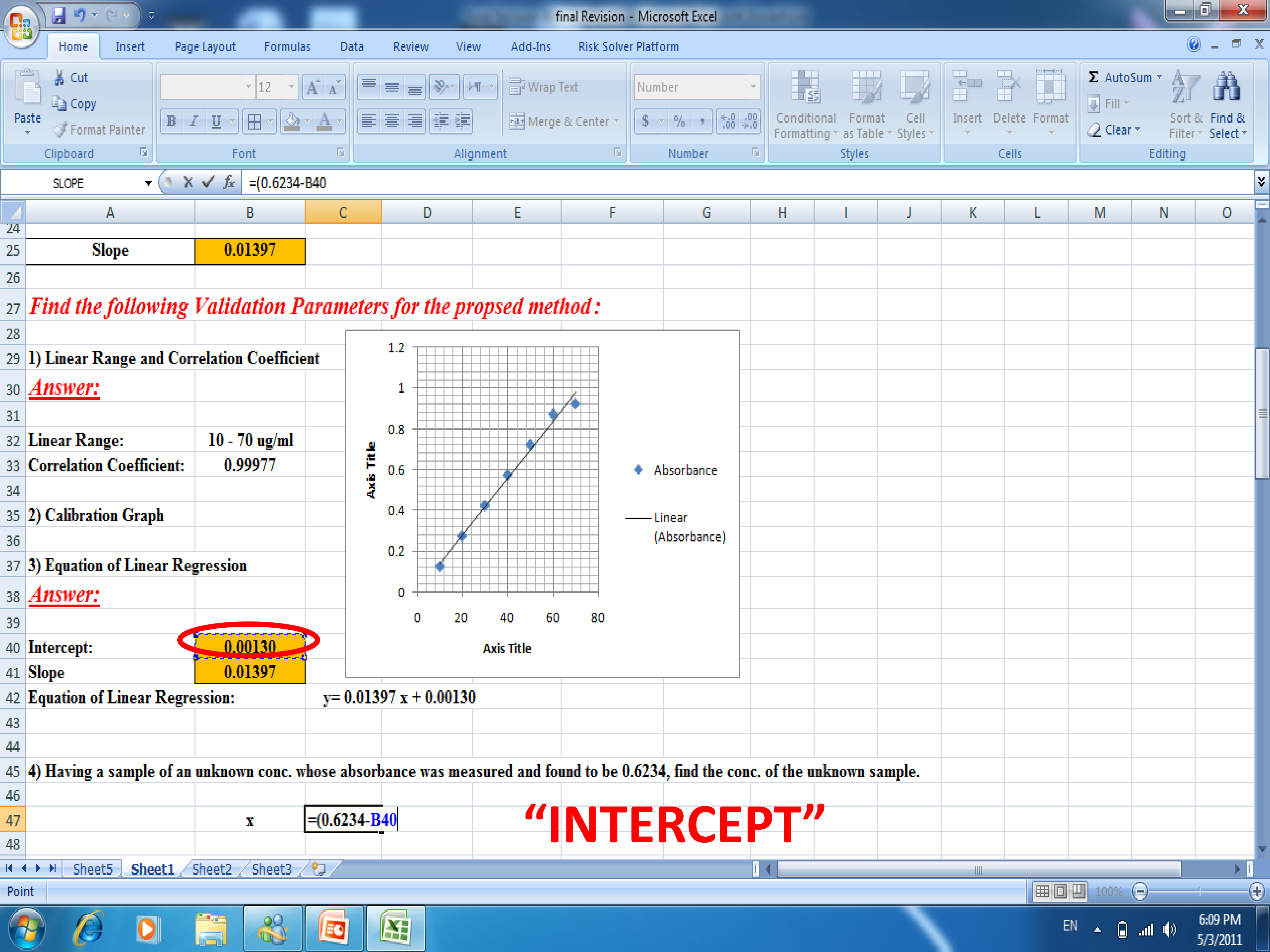
Answer:

By direct substitution in the above equation; x only is the unknown

$$0.315 = 0.02037\ x + 0.02043$$

Therefore; $x = (0.315 - 0.02043) / 0.02037$

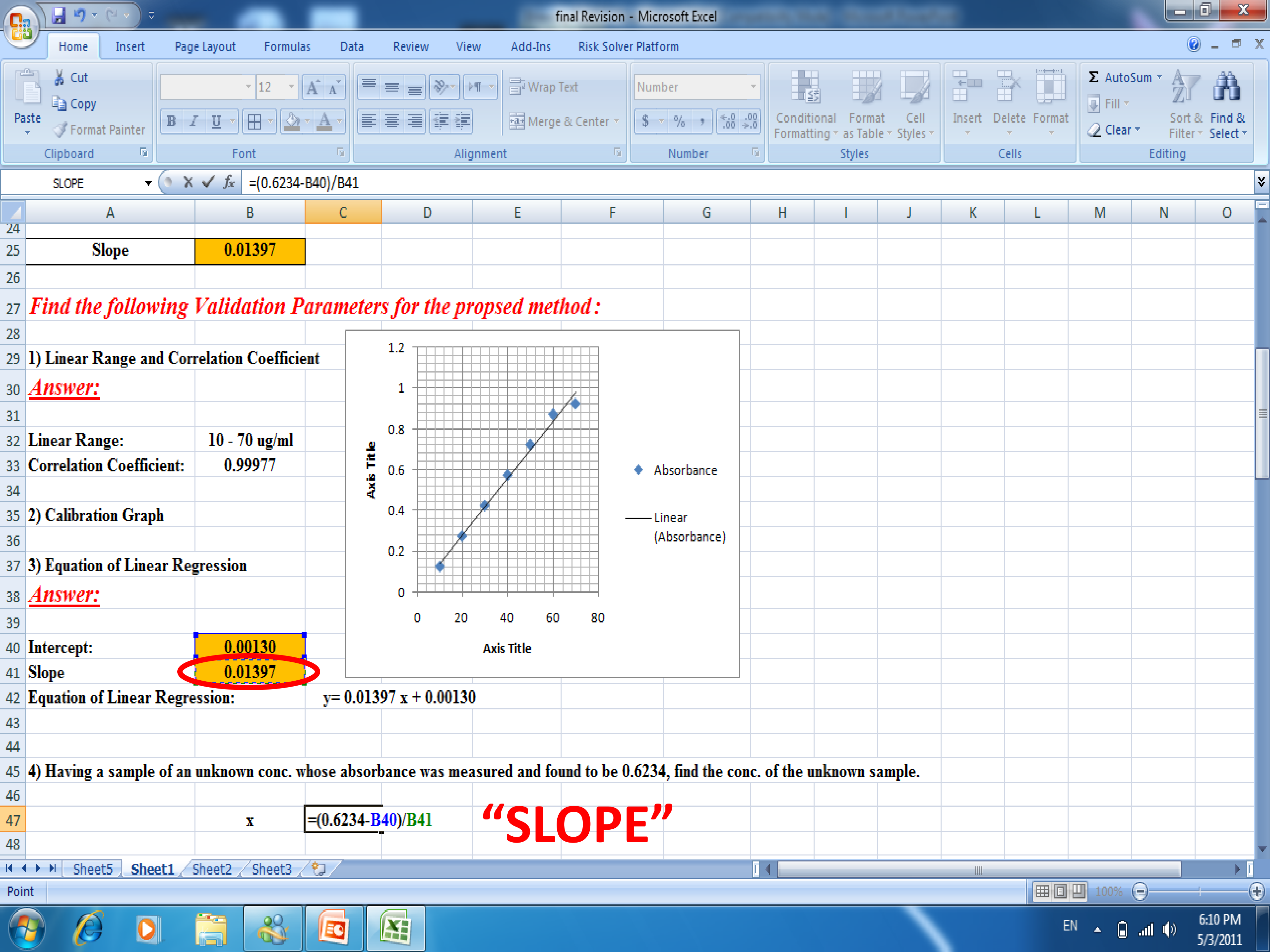
$x = 14.46$ ug/ml *(Recovery)*



SLOPE =(0.6234-B40

	A	B	C
25	**Slope**	**0.01397**	
27	*Find the following Validation Parameters for the propsed method :*		
29	**1) Linear Range and Correlation Coefficient**		
30	***Answer:***		
32	**Linear Range:**	**10 - 70 ug/ml**	
33	**Correlation Coefficient:**	**0.99977**	
35	**2) Calibration Graph**		
37	**3) Equation of Linear Regression**		
38	***Answer:***		
40	**Intercept:**	**0.00130**	
41	**Slope**	**0.01397**	
42	**Equation of Linear Regression:**		**y= 0.01397 x + 0.00130**
45	**4) Having a sample of an unknown conc. whose absorbance was measured and found to be 0.6234, find the conc. of the unknown sample.**		
47		**x**	**=(0.6234-B40**

"INTERCEPT"



=(0.6234-B40)/B41

Slope	0.01397

Find the following Validation Parameters for the propsed method :

1) Linear Range and Correlation Coefficient

Answer:

Linear Range: 10 - 70 ug/ml

Correlation Coefficient: 0.99977

2) Calibration Graph

3) Equation of Linear Regression

Answer:

Intercept: 0.00130

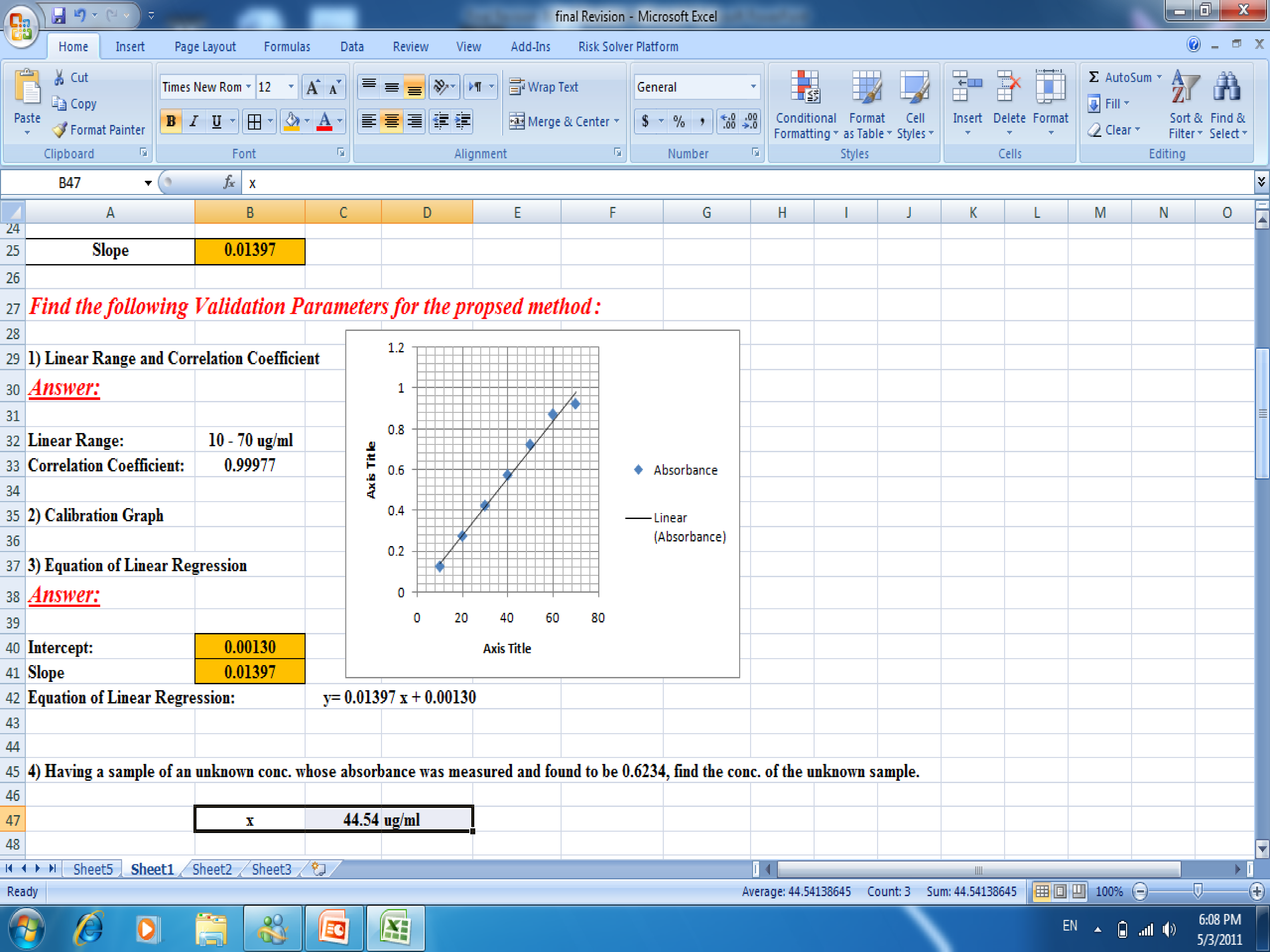
Slope 0.01397

Equation of Linear Regression: y= 0.01397 x + 0.00130

4) Having a sample of an unknown conc. whose absorbance was measured and found to be 0.6234, find the conc. of the unknown sample.

x =(0.6234-B40)/B41

"SLOPE"



f_x x

Slope	0.01397

Find the following Validation Parameters for the propsed method :

1) Linear Range and Correlation Coefficient

Answer:

Linear Range:	10 - 70 ug/ml
Correlation Coefficient:	0.99977

2) Calibration Graph

3) Equation of Linear Regression

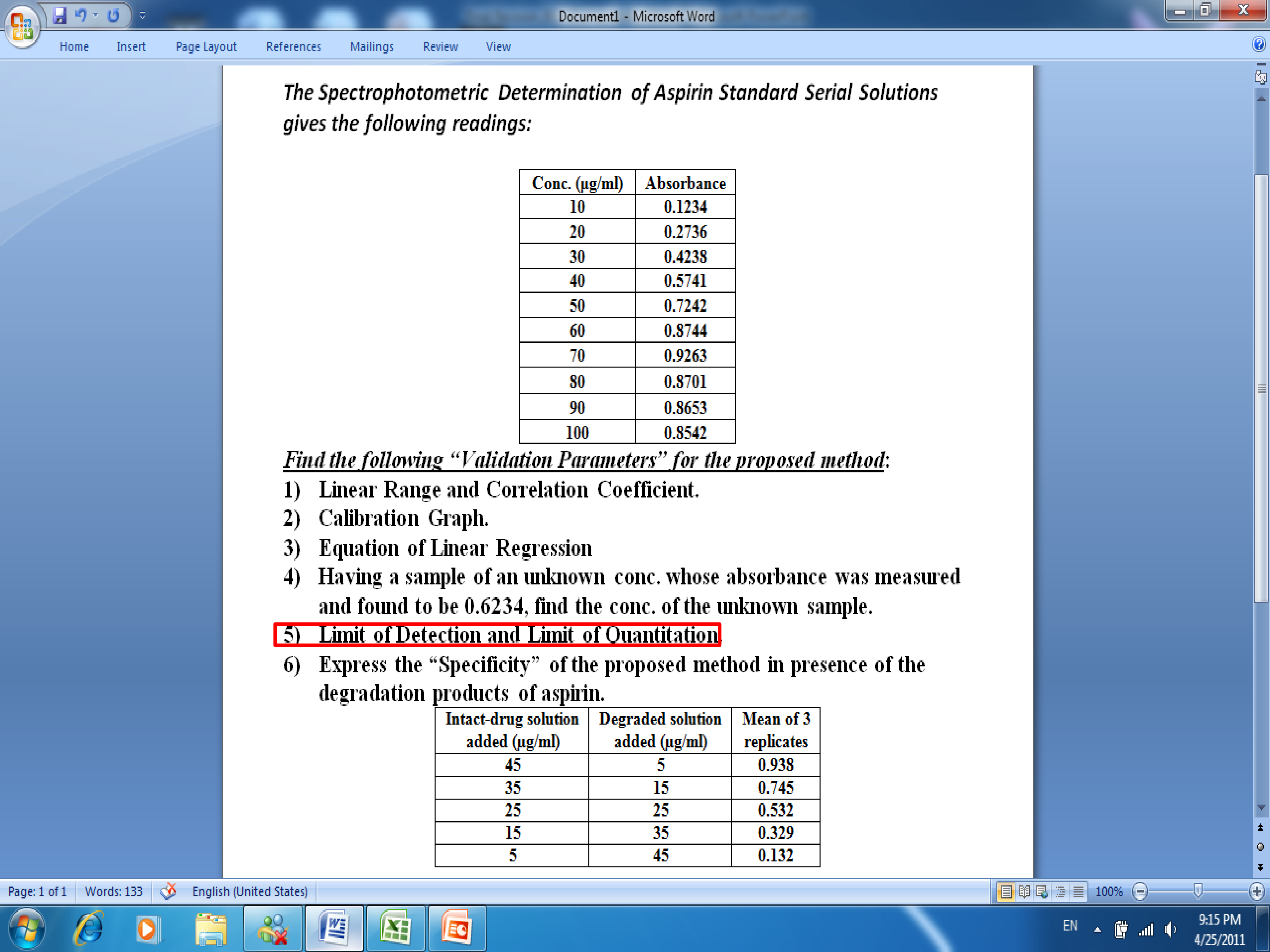
Answer:

Intercept:	0.00130
Slope	0.01397

Equation of Linear Regression: y= 0.01397 x + 0.00130

4) Having a sample of an unknown conc. whose absorbance was measured and found to be 0.6234, find the conc. of the unknown sample.

x	44.54 ug/ml



The Spectrophotometric Determination of Aspirin Standard Serial Solutions gives the following readings:

Conc. (µg/ml)	Absorbance
10	0.1234
20	0.2736
30	0.4238
40	0.5741
50	0.7242
60	0.8744
70	0.9263
80	0.8701
90	0.8653
100	0.8542

***Find the following "Validation Parameters" for the proposed method*:**

1) Linear Range and Correlation Coefficient.
2) Calibration Graph.
3) Equation of Linear Regression
4) Having a sample of an unknown conc. whose absorbance was measured and found to be 0.6234, find the conc. of the unknown sample.
5) Limit of Detection and Limit of Quantitation.
6) Express the "Specificity" of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates
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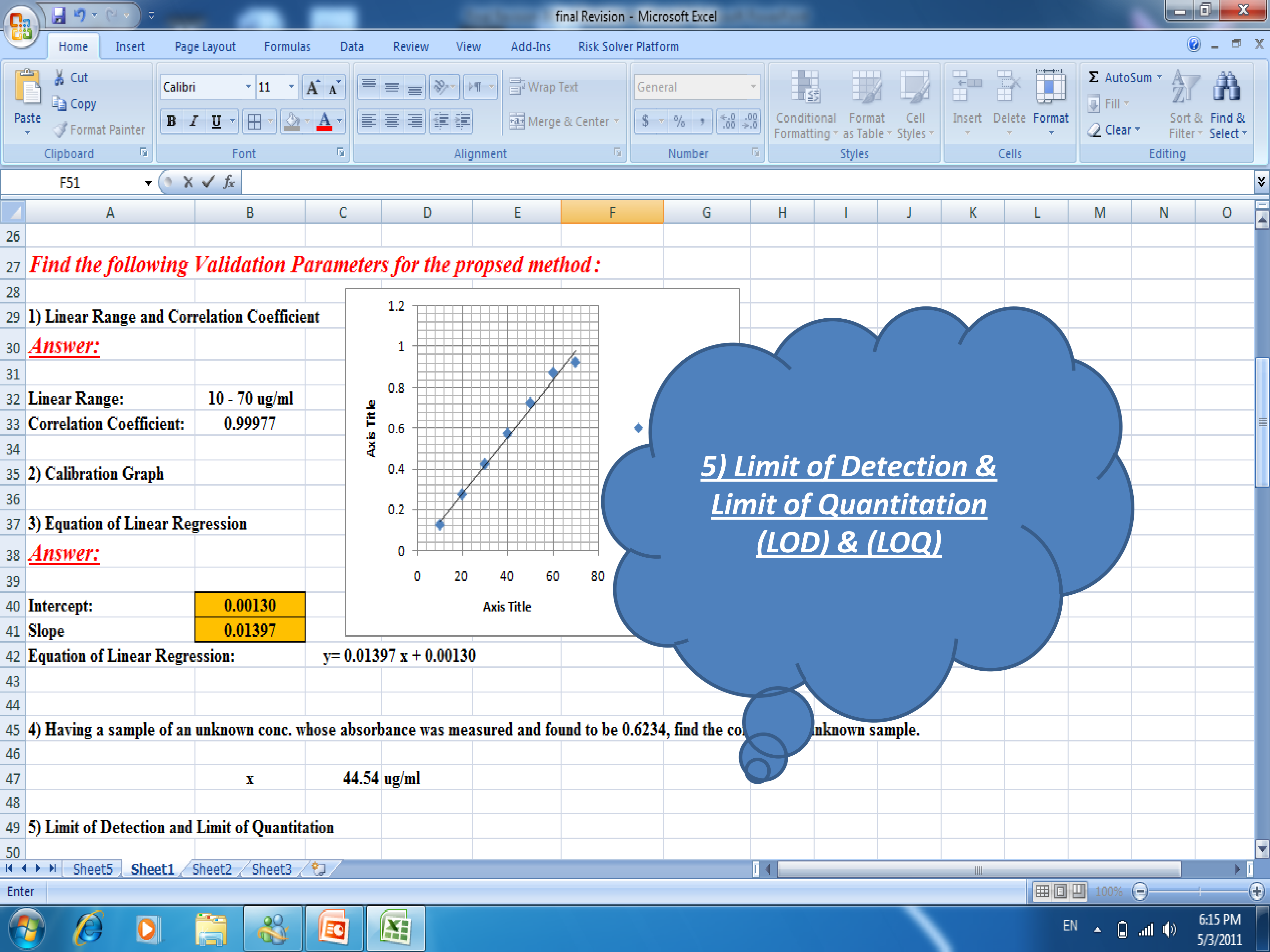


26

27 *Find the following Validation Parameters for the propsed method :*

28

29 **1) Linear Range and Correlation Coefficient**

30 *Answer:*

31

32 **Linear Range:** 10 - 70 ug/ml

33 **Correlation Coefficient:** 0.99977

34

35 **2) Calibration Graph**

36

37 **3) Equation of Linear Regression**

38 *Answer:*

39

40 Intercept:	0.00130
41 Slope	0.01397

42 **Equation of Linear Regression:** y= 0.01397 x + 0.00130

43

44

45 **4) Having a sample of an unknown conc. whose absorbance was measured and found to be 0.6234, find the co nknown sample.**

46

47 x 44.54 ug/ml

48

49 **5) Limit of Detection and Limit of Quantitation**

50

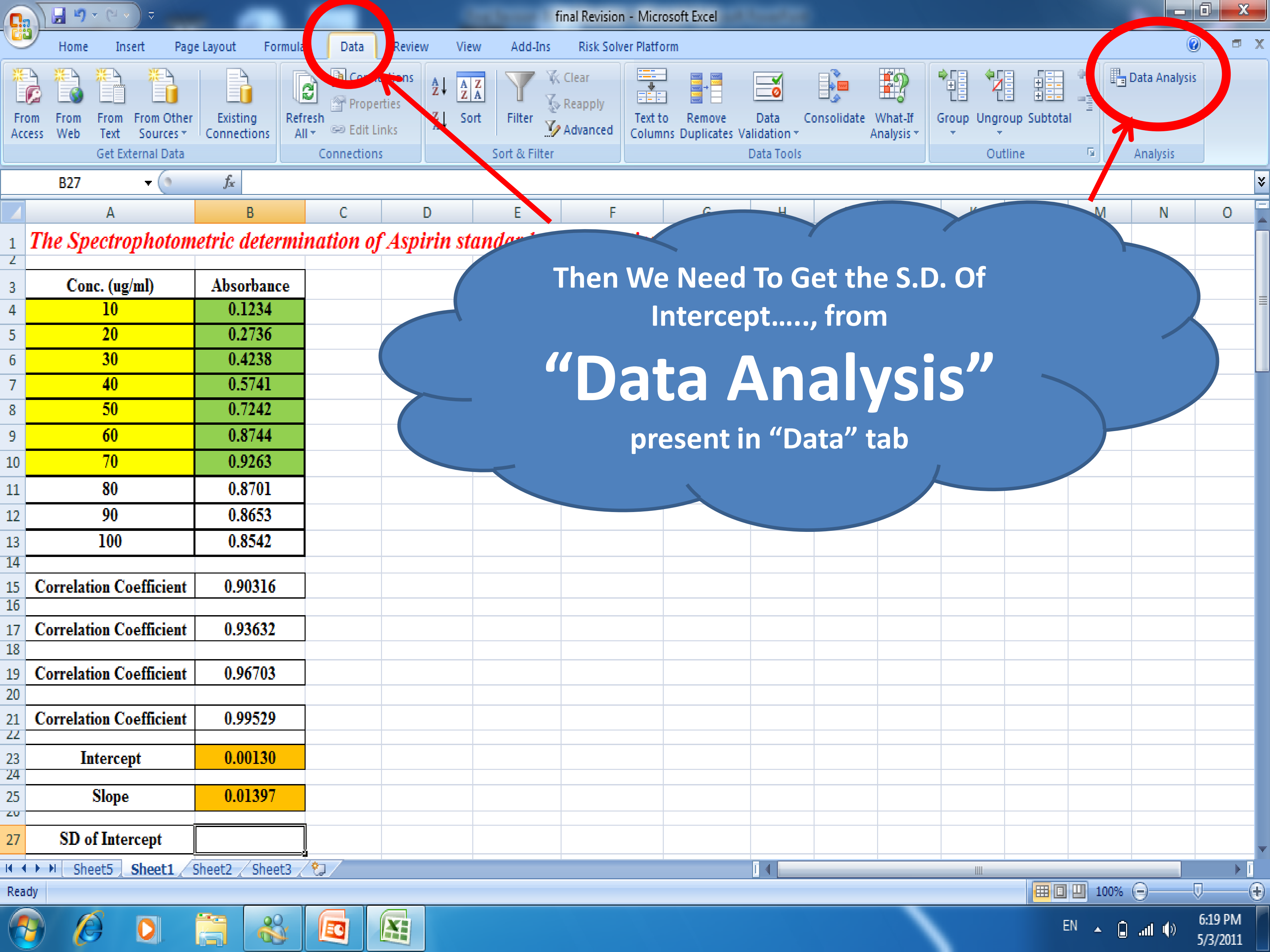
5) Limit of Detection &
Limit of Quantitation
(LOD) & (LOQ)

* Limit of Detection (LOD)

LOD = 3.3 * (S.D. of Intercept / Slope)

* Limit of Quantitation (LOQ)

LOQ = 10 * (S.D. of Intercept / Slope)



Then We Need To Get the S.D. Of Intercept….., from

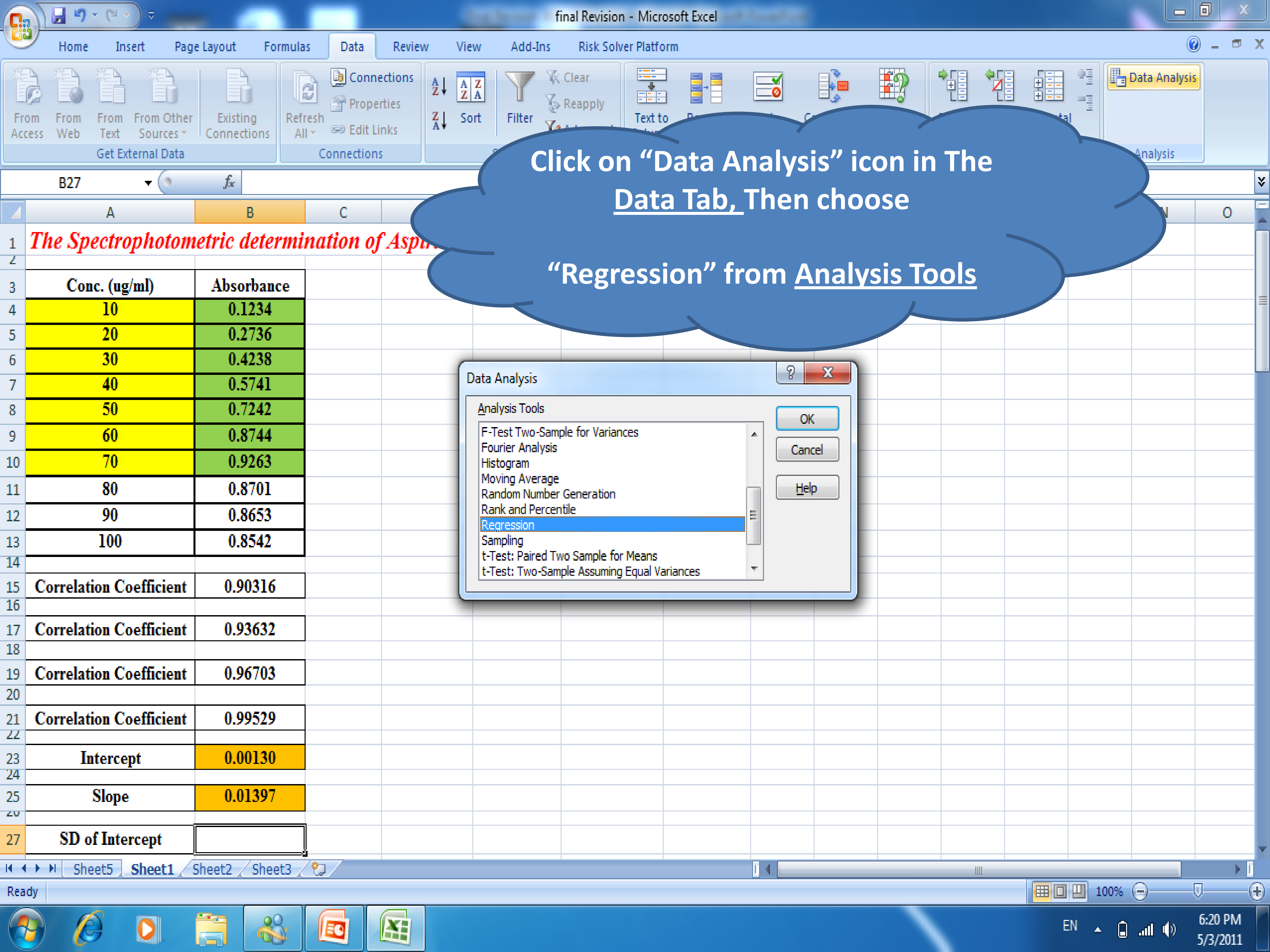
“Data Analysis”

present in “Data” tab

The Spectrophotometric determination of Aspirin standar

Conc. (ug/ml)	Absorbance
10	0.1234
20	0.2736
30	0.4238
40	0.5741
50	0.7242
60	0.8744
70	0.9263
80	0.8701
90	0.8653
100	0.8542

Correlation Coefficient	0.90316
Correlation Coefficient	0.93632
Correlation Coefficient	0.96703
Correlation Coefficient	0.99529
Intercept	0.00130
Slope	0.01397
SD of Intercept	



Click on "Data Analysis" icon in The Data Tab, Then choose

"Regression" from Analysis Tools

The Spectrophotometric determination of Aspi

Conc. (ug/ml)	Absorbance
10	0.1234
20	0.2736
30	0.4238
40	0.5741
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60	0.8744
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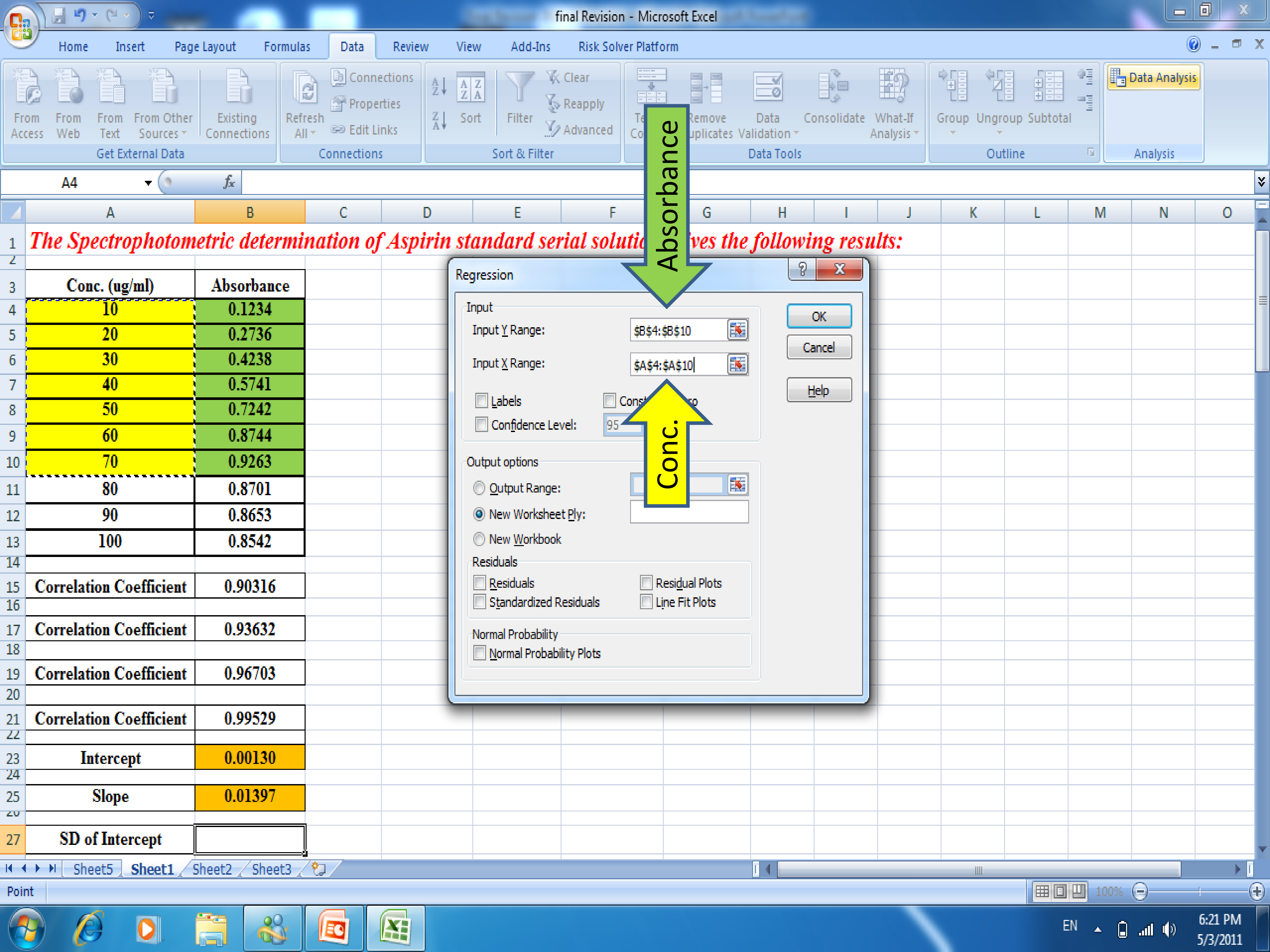
Correlation Coefficient	0.90316
Correlation Coefficient	0.93632
Correlation Coefficient	0.96703
Correlation Coefficient	0.99529
Intercept	0.00130
Slope	0.01397
SD of Intercept	

Analysis Tools:
- F-Test Two-Sample for Variances
- Fourier Analysis
- Histogram
- Moving Average
- Random Number Generation
- Rank and Percentile
- Regression
- Sampling
- t-Test: Paired Two Sample for Means
- t-Test: Two-Sample Assuming Equal Variances



The Spectrophotometric determination of Aspirin standard serial soluti ves the following results:

Conc. (ug/ml)	Absorbance
10	0.1234
20	0.2736
30	0.4238
40	0.5741
50	0.7242
60	0.8744
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90	0.8653
100	0.8542
Correlation Coefficient	0.90316
Correlation Coefficient	0.93632
Correlation Coefficient	0.96703
Correlation Coefficient	0.99529
Intercept	0.00130
Slope	0.01397
SD of Intercept	

Regression

Input

Input Y Range: $B$4:$B$10

Input X Range: $A$4:$A$10

☐ Labels ☐ Cons ro

☐ Confidence Level: 95

Output options

○ Output Range:

● New Worksheet Ply:

○ New Workbook

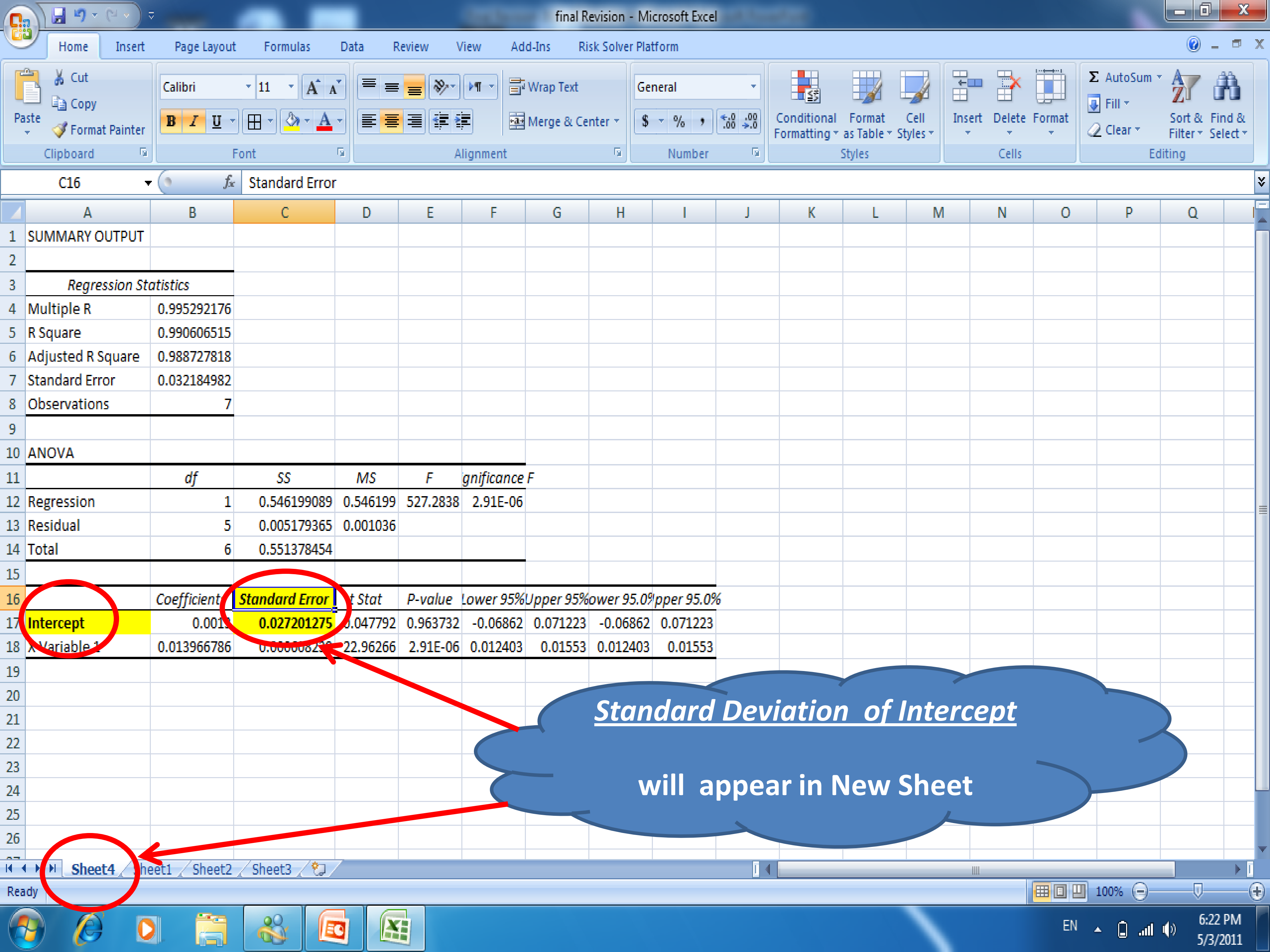
Residuals

☐ Residuals ☐ Residual Plots

☐ Standardized Residuals ☐ Line Fit Plots

Normal Probability

☐ Normal Probability Plots

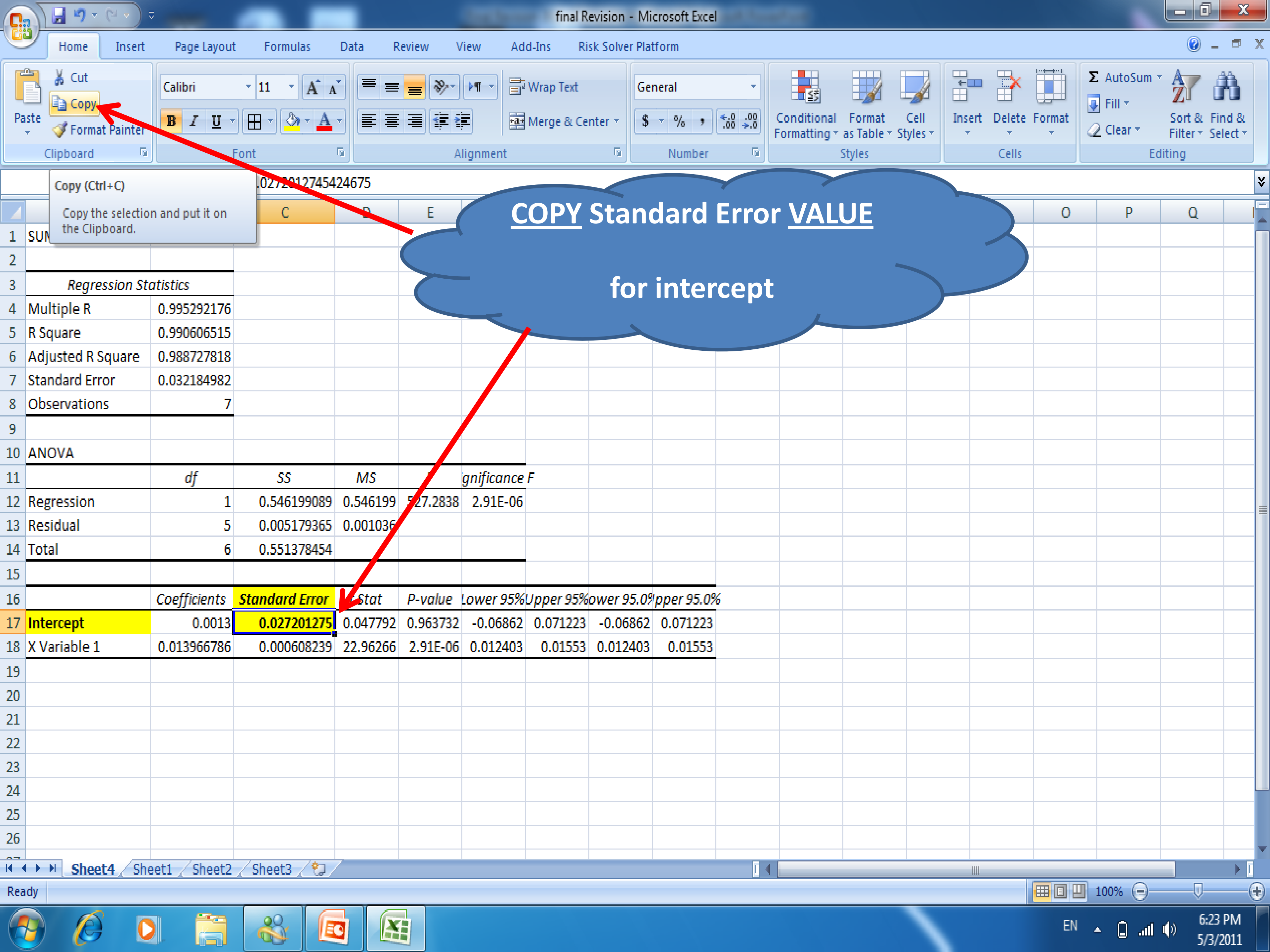

final Revision - Microsoft Excel
Home Insert Page Layout Formulas Data Review View Add-Ins Risk Solver Platform
Paste Cut Copy Format Painter Clipboard
Calibri 11 Font
Wrap Text Merge & Center Alignment
General Number
Conditional Formatting Format as Table Cell Styles Styles
Insert Delete Format Cells
AutoSum Fill Clear Sort & Filter Find & Select Editing
Sheet4 Sheet1 Sheet2 Sheet3
Ready 100%
EN 6:22 PM 5/3/2011

C16 *fx* Standard Error

	A	B	C	D	E	F	G	H	I
1	SUMMARY OUTPUT								
2									
3	*Regression Statistics*								
4	Multiple R	0.995292176							
5	R Square	0.990606515							
6	Adjusted R Square	0.988727818							
7	Standard Error	0.032184982							
8	Observations	7							
9									
10	ANOVA								
11		*df*	*SS*	*MS*	*F*	*gnificance F*			
12	Regression	1	0.546199089	0.546199	527.2838	2.91E-06			
13	Residual	5	0.005179365	0.001036					
14	Total	6	0.551378454						
15									
16		*Coefficient*	***Standard Error***	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*pper 95.0%*
17	**Intercept**	0.001	**0.027201275**	.047792	0.963732	-0.06862	0.071223	-0.06862	0.071223
18	X Variable 1	0.013966786	[illegible]	22.96266	2.91E-06	0.012403	0.01553	0.012403	0.01553

Standard Deviation of Intercept

will appear in New Sheet



Copy (Ctrl+C)

Copy the selection and put it on the Clipboard.

.0272012745424675

COPY Standard Error VALUE

for intercept

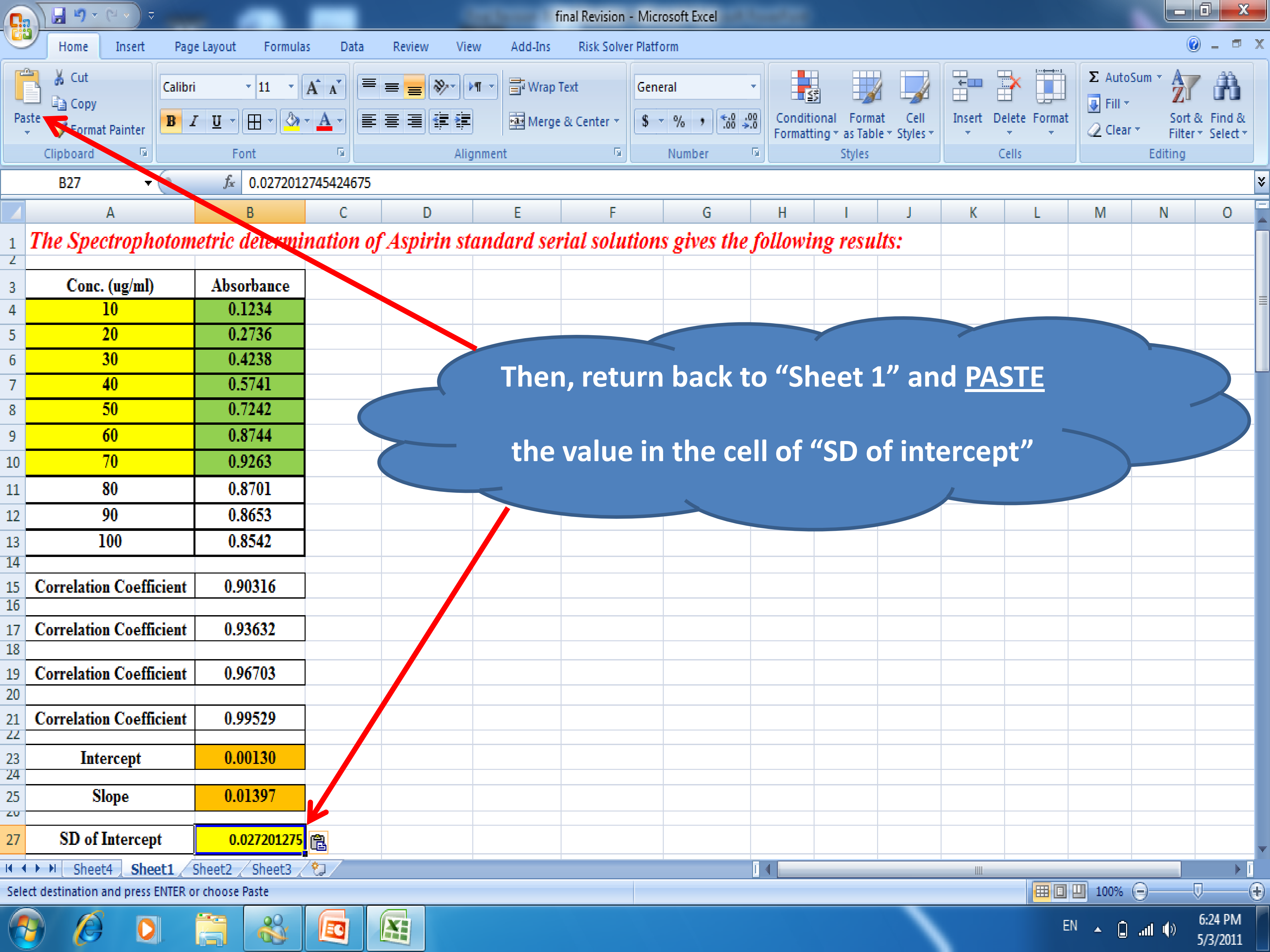
SUM

Regression Statistics	
Multiple R	0.995292176
R Square	0.990606515
Adjusted R Square	0.988727818
Standard Error	0.032184982
Observations	7

ANOVA

	df	*SS*	*MS*	*F*	*gnificance F*
Regression	1	0.546199089	0.546199	527.2838	2.91E-06
Residual	5	0.005179365	0.001036		
Total	6	0.551378454			

	Coefficients	***Standard Error***	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0*	*pper 95.0%*
Intercept	0.0013	**0.027201275**	0.047792	0.963732	-0.06862	0.071223	-0.06862	0.071223
X Variable 1	0.013966786	0.000608239	22.96266	2.91E-06	0.012403	0.01553	0.012403	0.01553



Then, return back to "Sheet 1" and PASTE

the value in the cell of "SD of intercept"

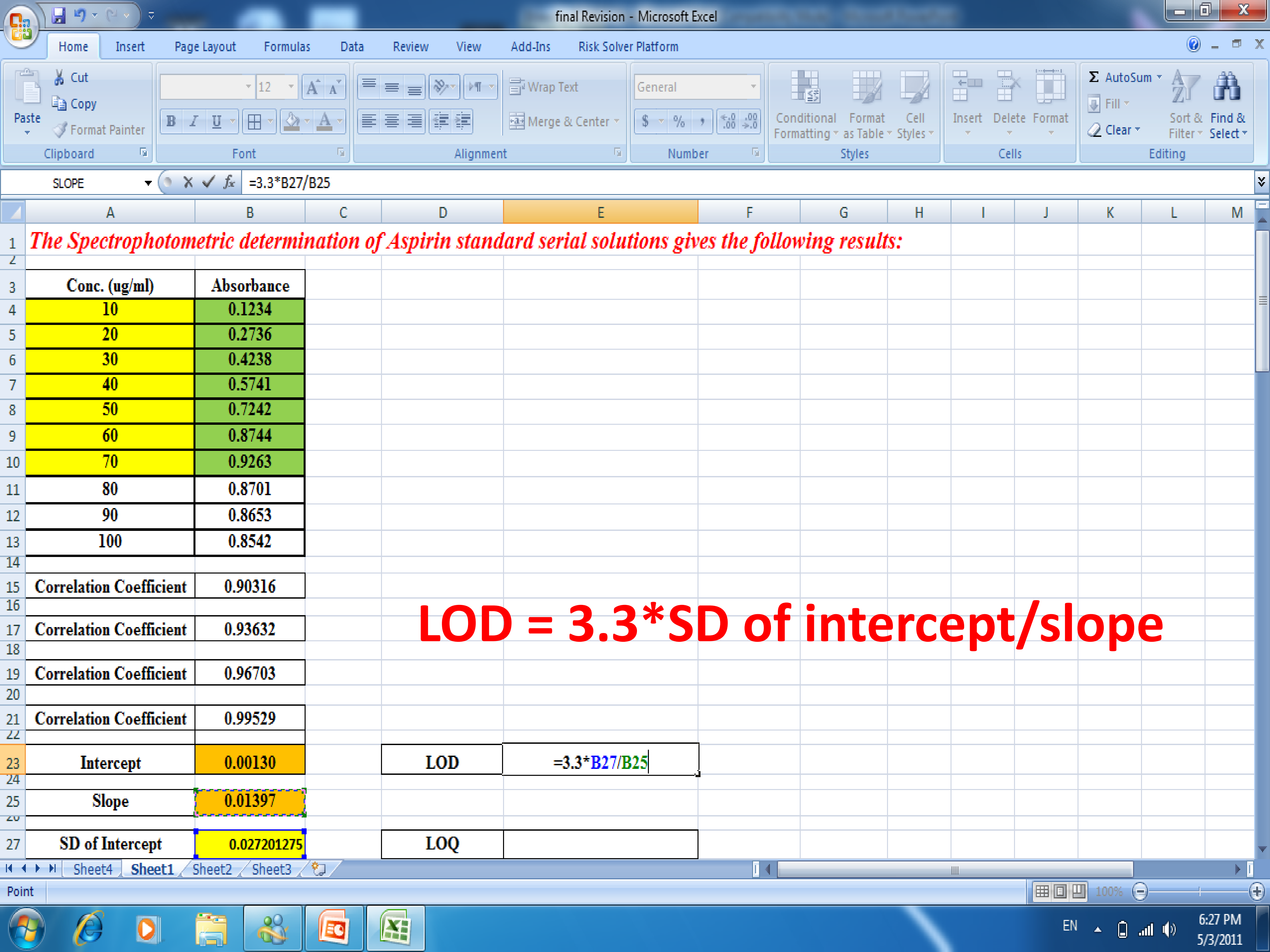
B27 = 0.0272012745424675

The Spectrophotometric determination of Aspirin standard serial solutions gives the following results:

Conc. (ug/ml)	Absorbance
10	0.1234
20	0.2736
30	0.4238
40	0.5741
50	0.7242
60	0.8744
70	0.9263
80	0.8701
90	0.8653
100	0.8542

Correlation Coefficient	0.90316
Correlation Coefficient	0.93632
Correlation Coefficient	0.96703
Correlation Coefficient	0.99529
Intercept	0.00130
Slope	0.01397
SD of Intercept	0.027201275

Select destination and press ENTER or choose Paste



SLOPE =3.3*B27/B25

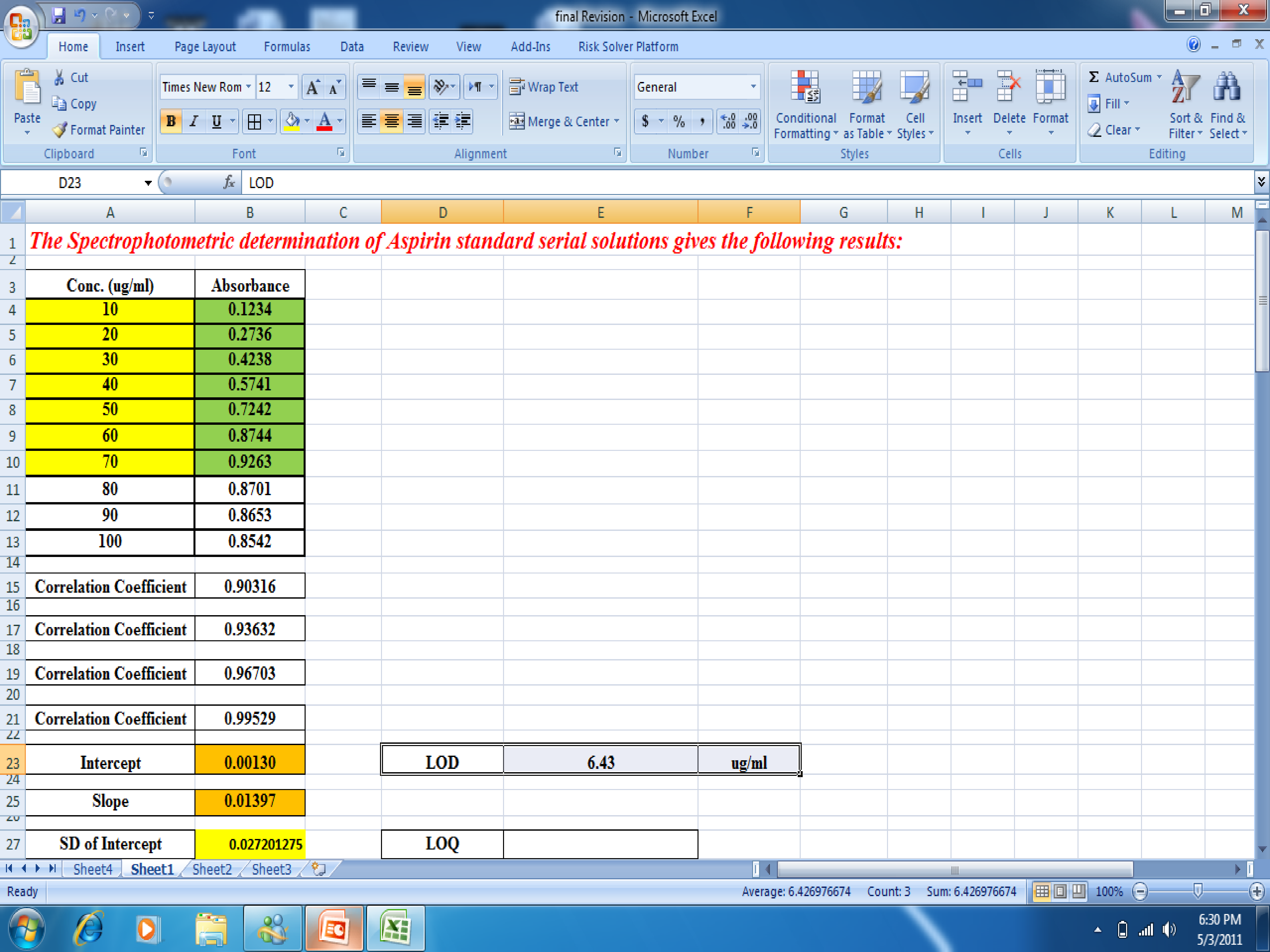
The Spectrophotometric determination of Aspirin standard serial solutions gives the following results:

Conc. (ug/ml)	Absorbance
10	0.1234
20	0.2736
30	0.4238
40	0.5741
50	0.7242
60	0.8744
70	0.9263
80	0.8701
90	0.8653
100	0.8542

Correlation Coefficient	0.90316
Correlation Coefficient	0.93632
Correlation Coefficient	0.96703
Correlation Coefficient	0.99529
Intercept	0.00130
Slope	0.01397
SD of Intercept	0.027201275

LOD = 3.3*SD of intercept/slope

LOD	=3.3*B27/B25
LOQ	



D23 | LOD

The Spectrophotometric determination of Aspirin standard serial solutions gives the following results:

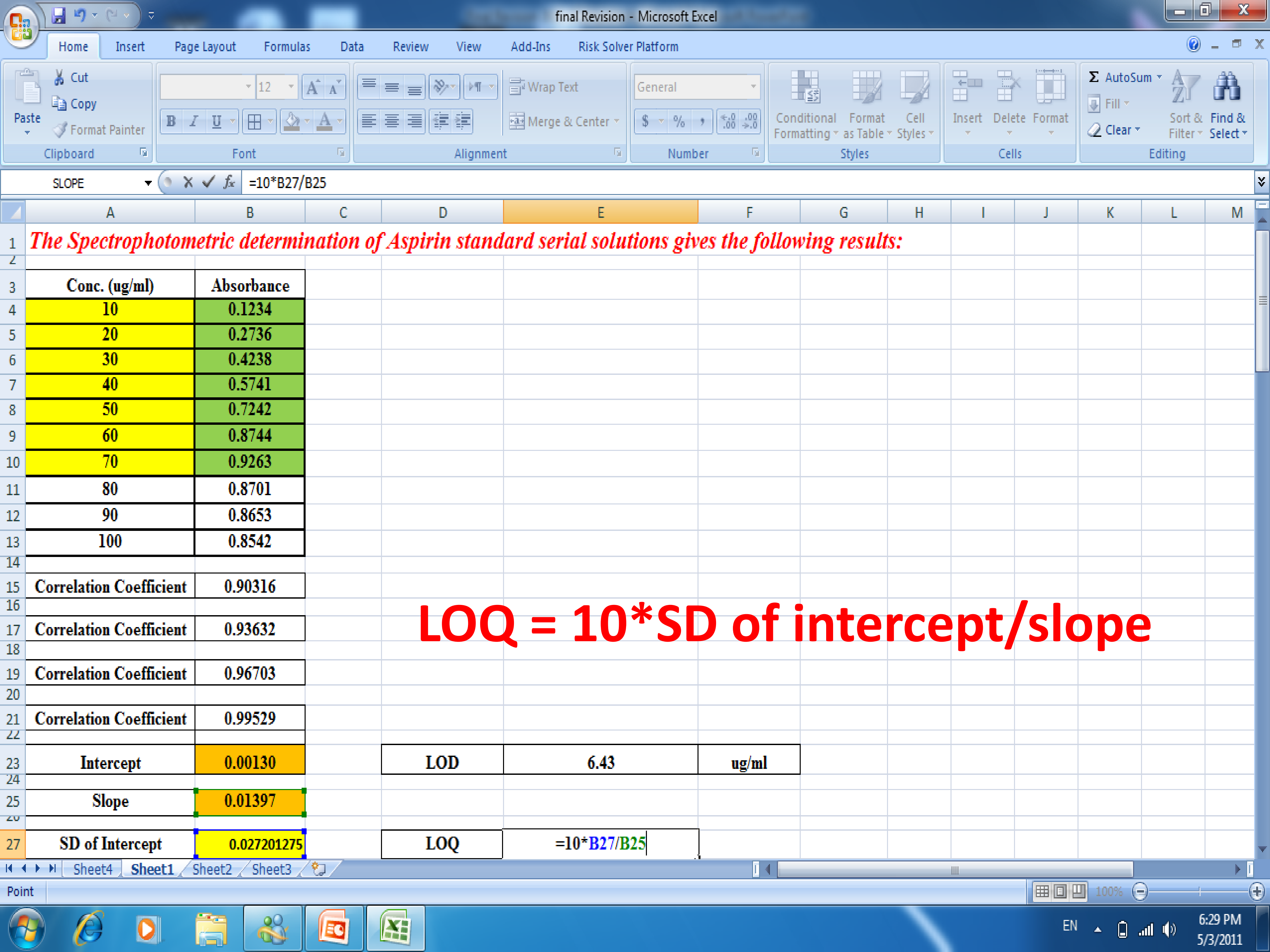
Conc. (ug/ml)	Absorbance
10	0.1234
20	0.2736
30	0.4238
40	0.5741
50	0.7242
60	0.8744
70	0.9263
80	0.8701
90	0.8653
100	0.8542

Correlation Coefficient	0.90316
Correlation Coefficient	0.93632
Correlation Coefficient	0.96703
Correlation Coefficient	0.99529
Intercept	0.00130
Slope	0.01397
SD of Intercept	0.027201275

LOD	6.43	ug/ml
LOQ		

Ready

Average: 6.426976674 Count: 3 Sum: 6.426976674



Formula bar: =10*B27/B25

The Spectrophotometric determination of Aspirin standard serial solutions gives the following results:

Conc. (ug/ml)	Absorbance
10	0.1234
20	0.2736
30	0.4238
40	0.5741
50	0.7242
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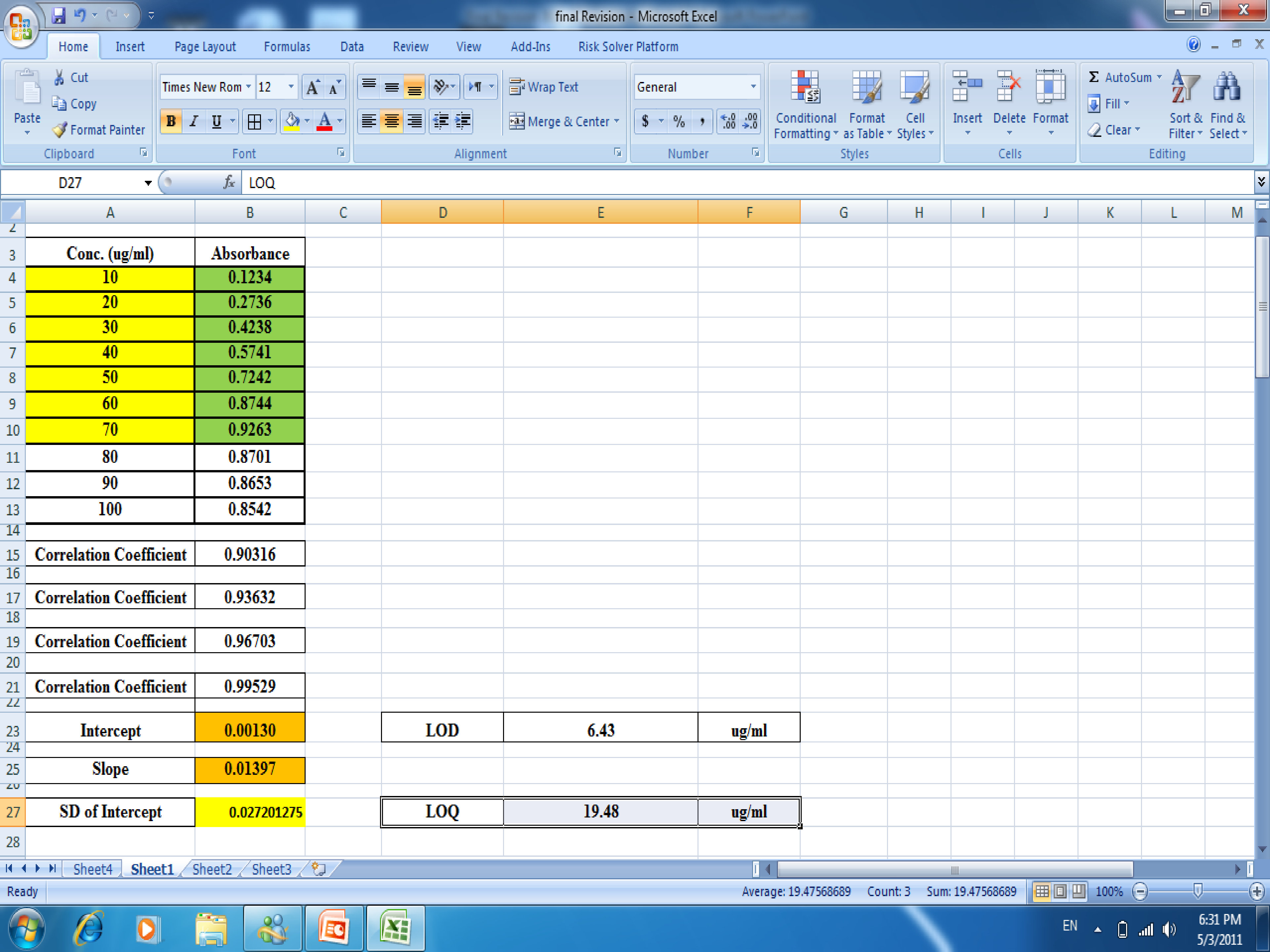
90	0.8653
100	0.8542

Correlation Coefficient	0.90316
Correlation Coefficient	0.93632
Correlation Coefficient	0.96703
Correlation Coefficient	0.99529
Intercept	0.00130
Slope	0.01397
SD of Intercept	0.027201275

LOQ = 10*SD of intercept/slope

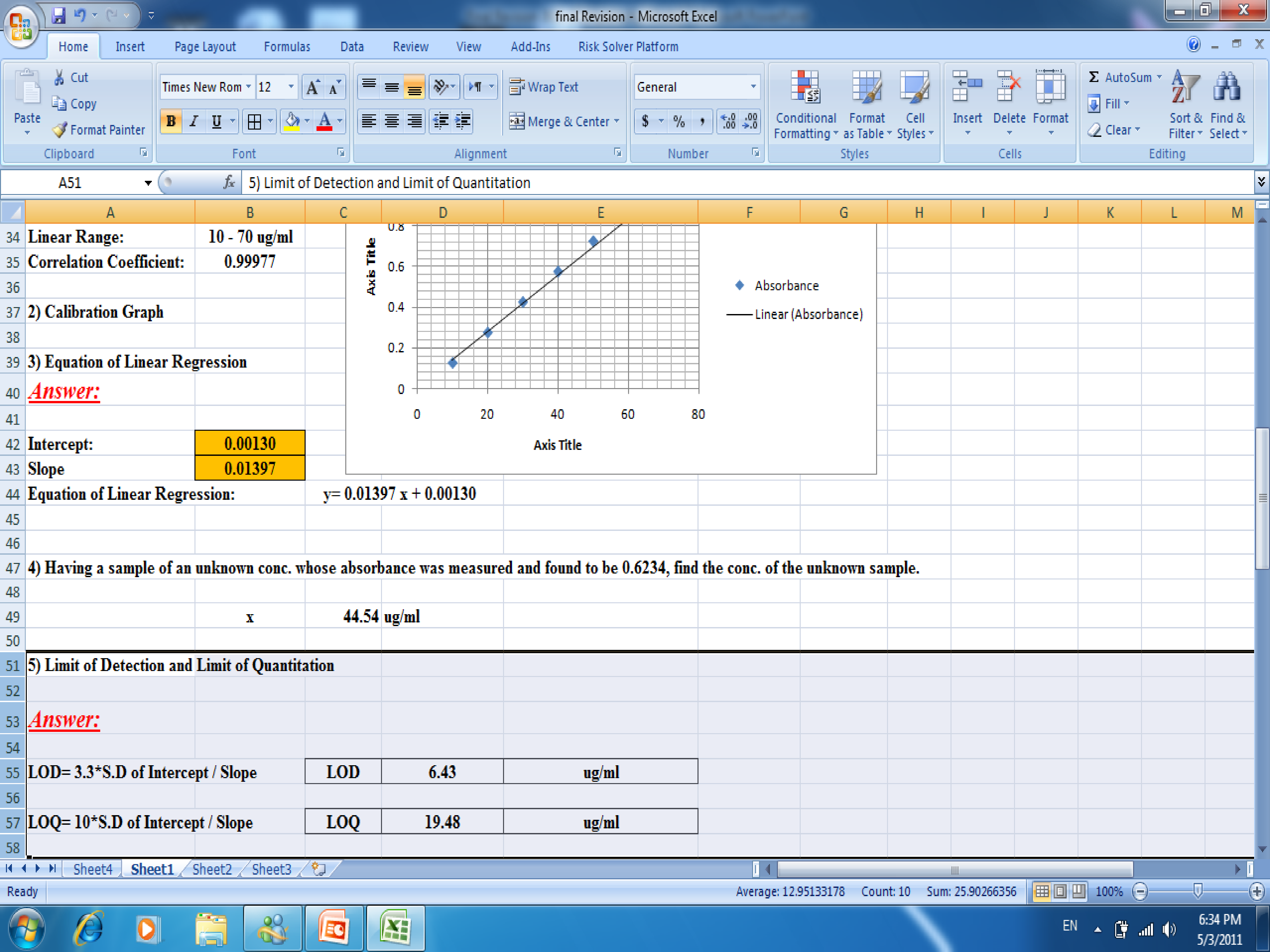
LOD	6.43	ug/ml
LOQ	=10*B27/B25	



D27 LOQ

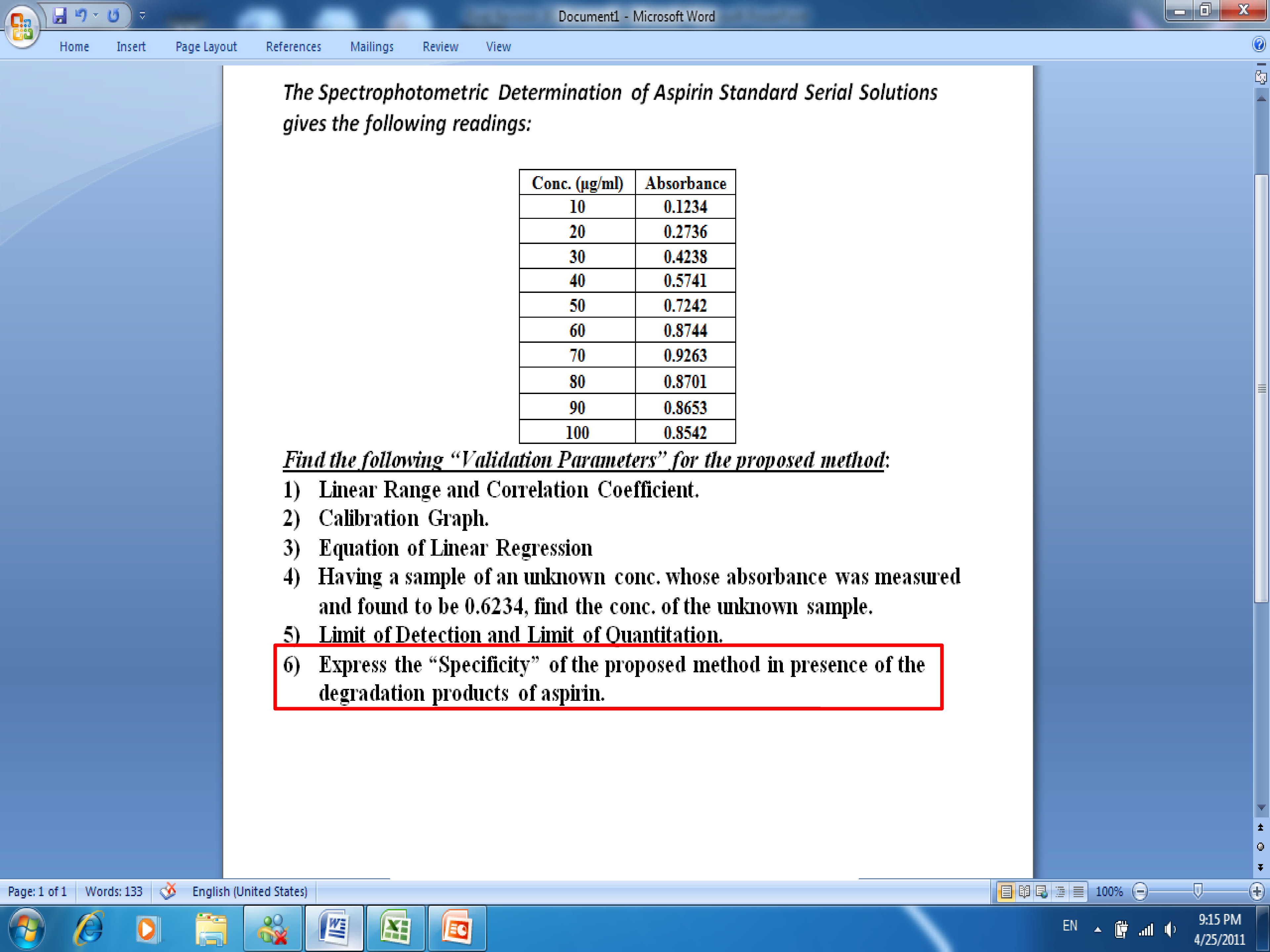
	A	B	C	D	E	F
3	Conc. (ug/ml)	Absorbance				
4	10	0.1234				
5	20	0.2736				
6	30	0.4238				
7	40	0.5741				
8	50	0.7242				
9	60	0.8744				
10	70	0.9263				
11	80	0.8701				
12	90	0.8653				
13	100	0.8542				
15	Correlation Coefficient	0.90316				
17	Correlation Coefficient	0.93632				
19	Correlation Coefficient	0.96703				
21	Correlation Coefficient	0.99529				
23	Intercept	0.00130		LOD	6.43	ug/ml
25	Slope	0.01397				
27	SD of Intercept	0.027201275		LOQ	19.48	ug/ml

Average: 19.47568689 Count: 3 Sum: 19.47568689



5) Limit of Detection and Limit of Quantitation

	A	B	C	D	E
34	**Linear Range:**	10 - 70 ug/ml			
35	**Correlation Coefficient:**	0.99977			
36					
37	**2) Calibration Graph**				
38					
39	**3) Equation of Linear Regression**				
40	***Answer:***				
41					
42	**Intercept:**	0.00130			
43	**Slope**	0.01397			
44	**Equation of Linear Regression:**		y= 0.01397 x + 0.00130		
45					
46					
47	**4) Having a sample of an unknown conc. whose absorbance was measured and found to be 0.6234, find the conc. of the unknown sample.**				
48					
49		x	44.54	ug/ml	
50					
51	**5) Limit of Detection and Limit of Quantitation**				
52					
53	***Answer:***				
54					
55	**LOD= 3.3*S.D of Intercept / Slope**		LOD	6.43	ug/ml
56					
57	**LOQ= 10*S.D of Intercept / Slope**		LOQ	19.48	ug/ml
58					



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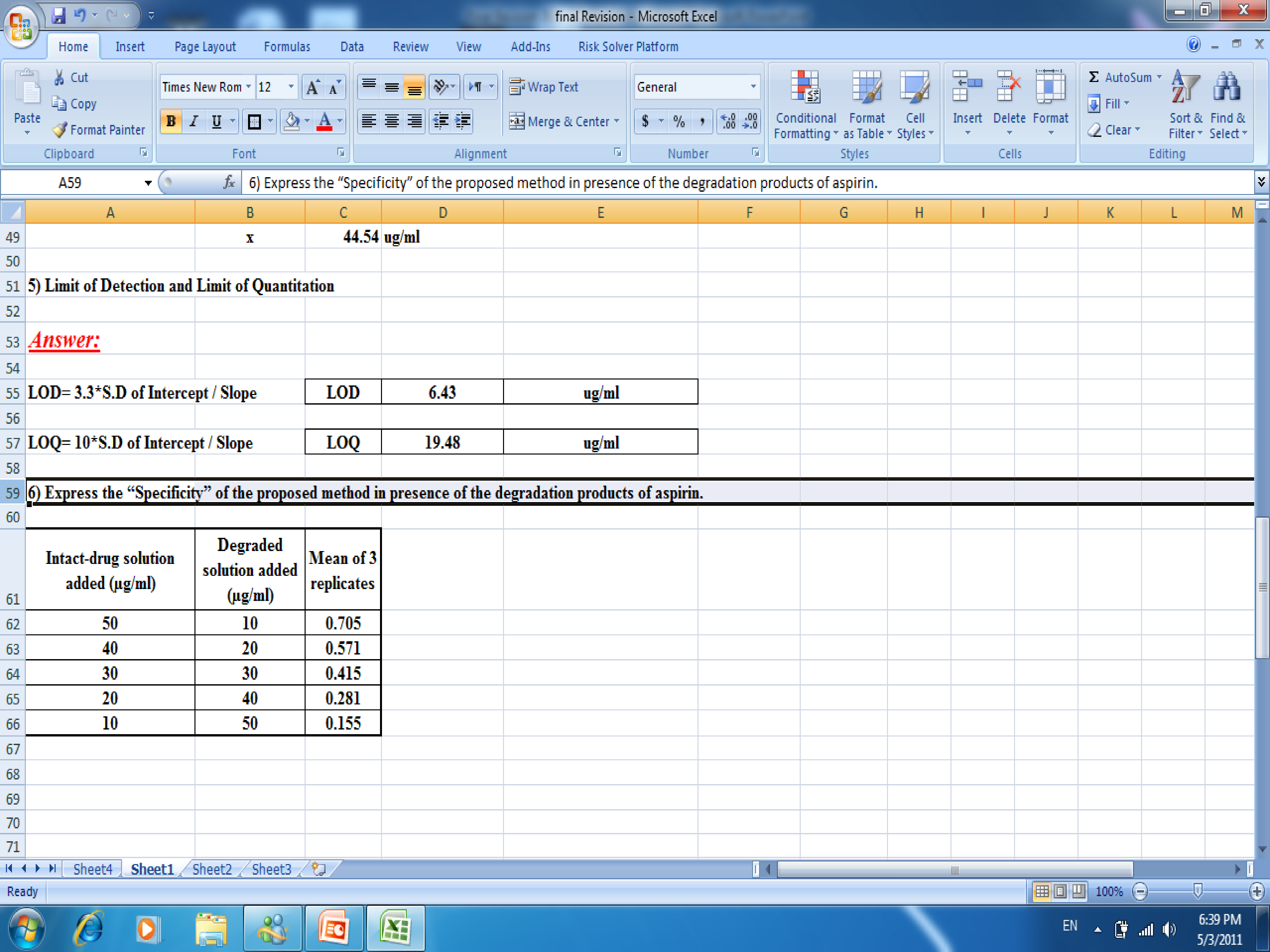
80	0.8701
90	0.8653
100	0.8542

Find the following "Validation Parameters" for the proposed method:

1) Linear Range and Correlation Coefficient.
2) Calibration Graph.
3) Equation of Linear Regression
4) Having a sample of an unknown conc. whose absorbance was measured and found to be 0.6234, find the conc. of the unknown sample.
5) Limit of Detection and Limit of Quantitation.
6) Express the "Specificity" of the proposed method in presence of the degradation products of aspirin.



6) Express the “Specificity” of the proposed method in presence of the degradation products of aspirin.

x 44.54 ug/ml

5) Limit of Detection and Limit of Quantitation

Answer:

LOD= 3.3*S.D of Intercept / Slope **LOD** **6.43** **ug/ml**

LOQ= 10*S.D of Intercept / Slope **LOQ** **19.48** **ug/ml**

6) Express the “Specificity” of the proposed method in presence of the degradation products of aspirin.

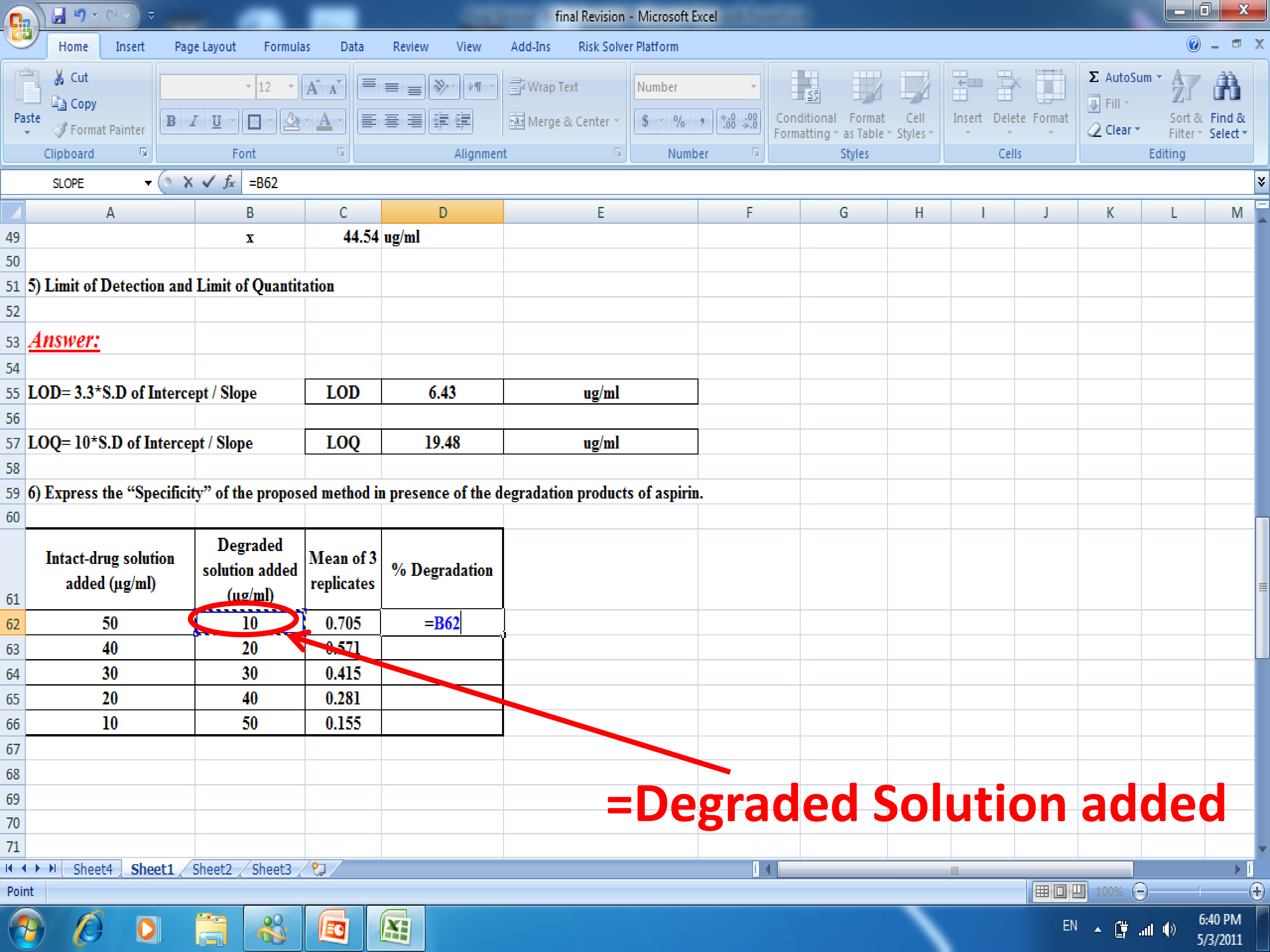
Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates
50	10	0.705
40	20	0.571
30	30	0.415
20	40	0.281
10	50	0.155

How to calculate specificity?

- By mixing calculated volumes of the intact drug solution with calculated volume of the degraded solutions , to obtain laboratory prepared mixture solutions.
- The mixtures were analyzed in triplicate. The mean of the 3 readings is calculated, then:

1 - % Degradation is calculated as follows:

% Degradation = Degraded solution added/(intact-drug solution added + degraded solution added)*100



SLOPE =B62

x 44.54 ug/ml

5) Limit of Detection and Limit of Quantitation

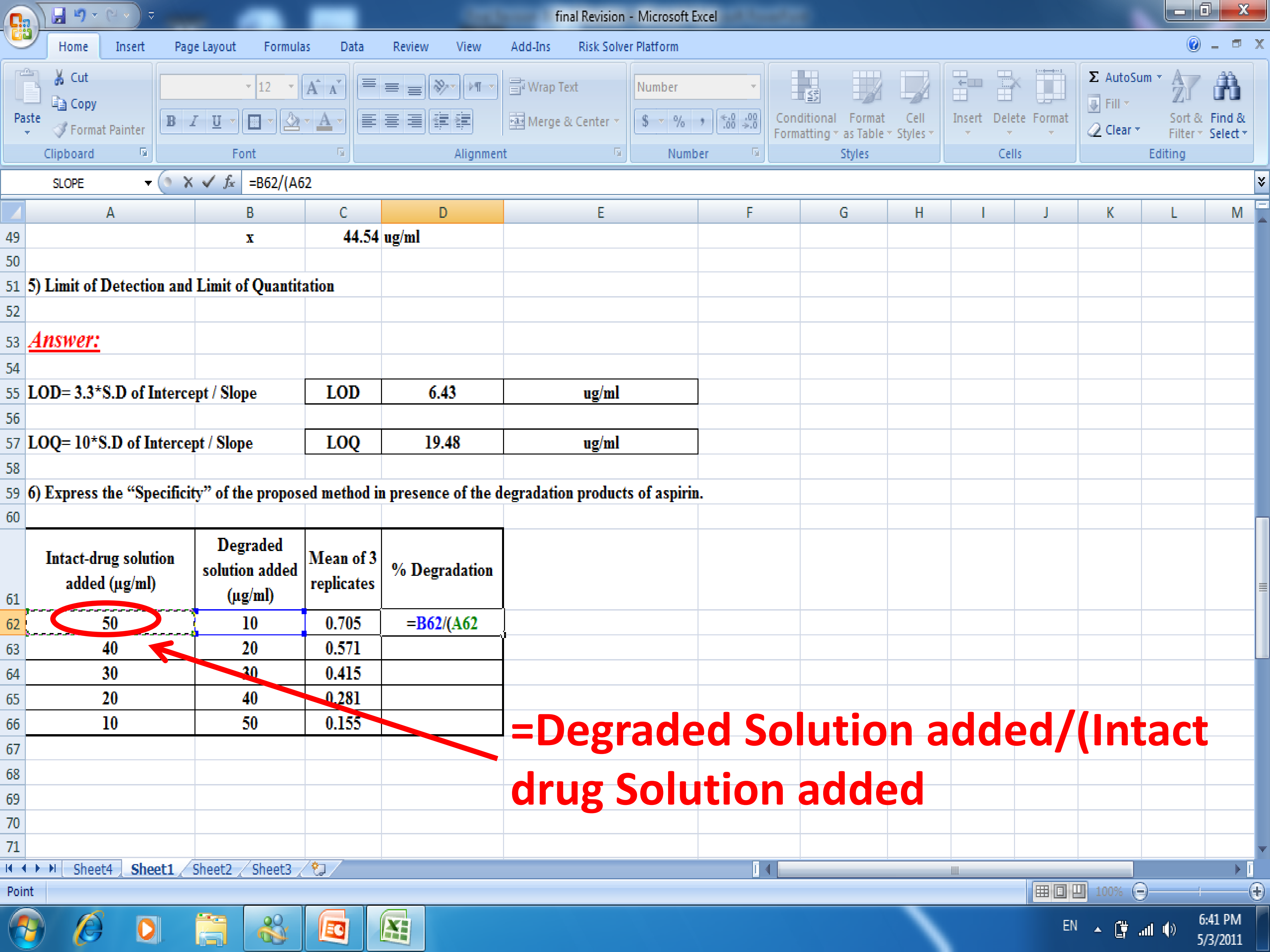
Answer:

LOD= 3.3*S.D of Intercept / Slope	LOD	6.43	ug/ml
LOQ= 10*S.D of Intercept / Slope	LOQ	19.48	ug/ml

6) Express the "Specificity" of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates	% Degradation
50	10	0.705	=B62
40	20	0.571	
30	30	0.415	
20	40	0.281	
10	50	0.155	

=Degraded Solution added



SLOPE

=B62/(A62

x 44.54 ug/ml

5) Limit of Detection and Limit of Quantitation

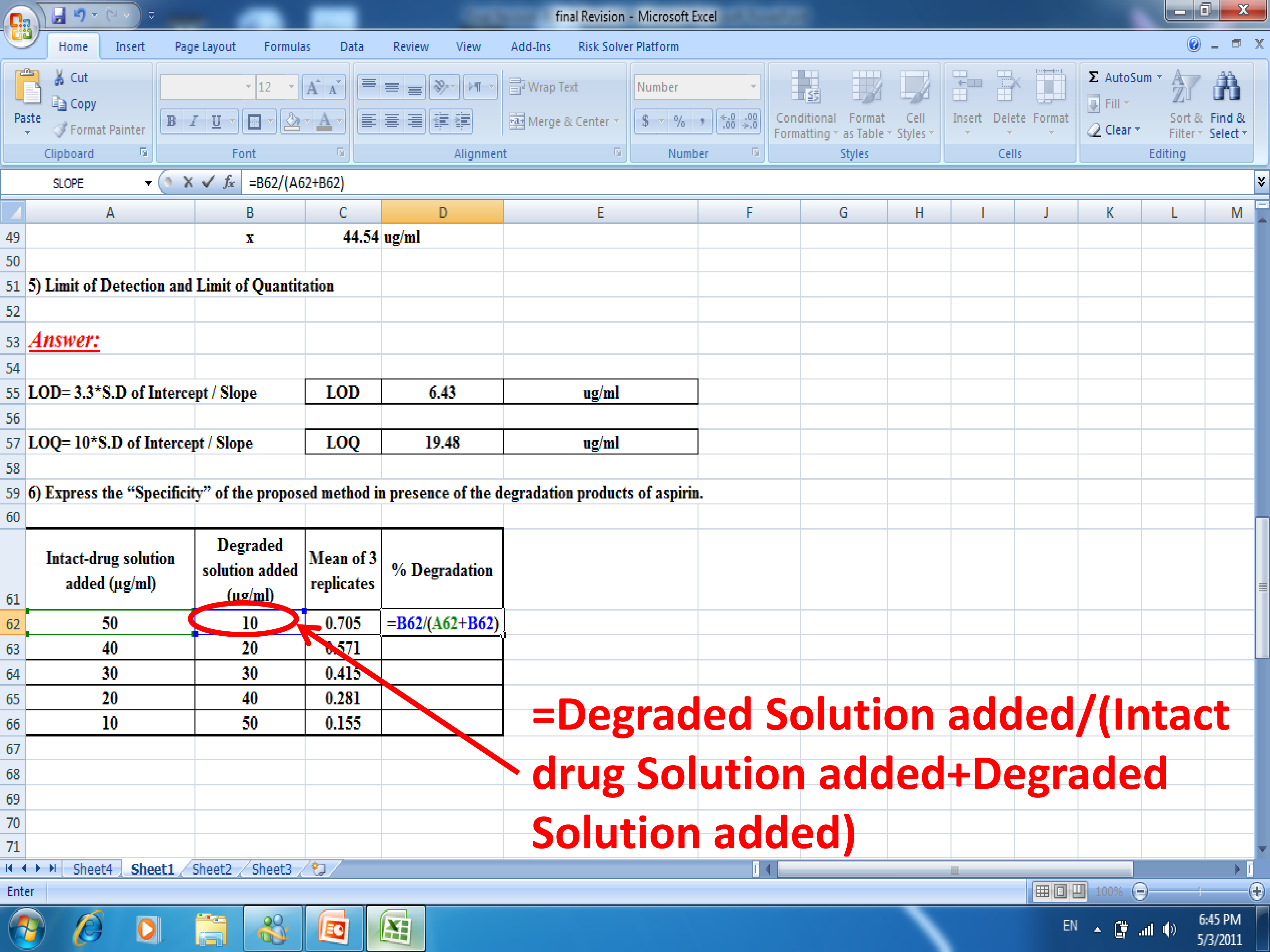
Answer:

LOD= 3.3*S.D of Intercept / Slope	LOD	6.43	ug/ml
LOQ= 10*S.D of Intercept / Slope	LOQ	19.48	ug/ml

6) Express the "Specificity" of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates	% Degradation
50	10	0.705	=B62/(A62
40	20	0.571	
30	30	0.415	
20	40	0.281	
10	50	0.155	

=Degraded Solution added/(Intact drug Solution added



=B62/(A62+B62)

x 44.54 ug/ml

5) Limit of Detection and Limit of Quantitation

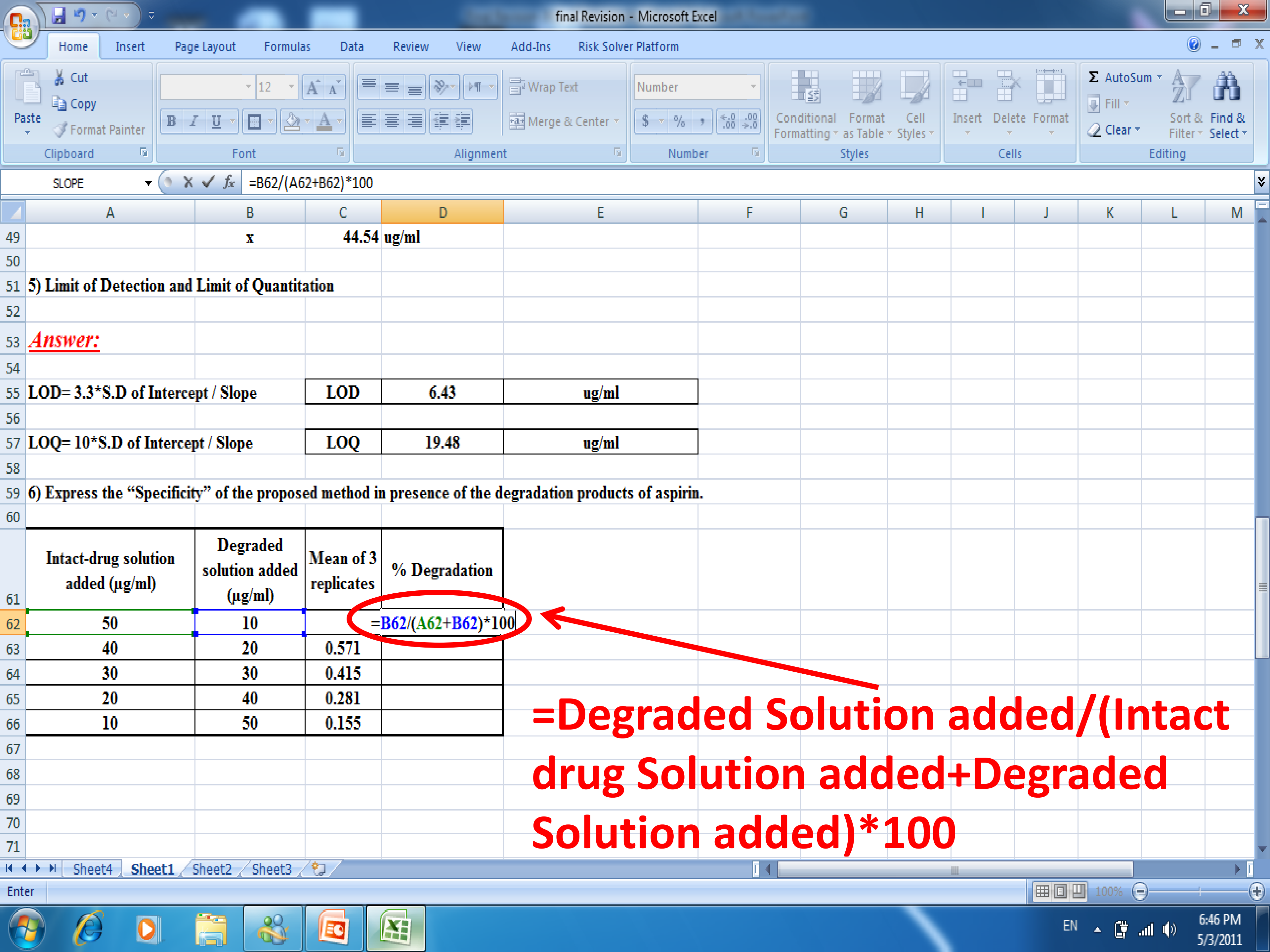
Answer:

LOD= 3.3*S.D of Intercept / Slope	LOD	6.43	ug/ml
LOQ= 10*S.D of Intercept / Slope	LOQ	19.48	ug/ml

6) Express the "Specificity" of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates	% Degradation
50	10	0.705	=B62/(A62+B62)
40	20	0.571	
30	30	0.415	
20	40	0.281	
10	50	0.155	

=Degraded Solution added/(Intact drug Solution added+Degraded Solution added)



SLOPE `=B62/(A62+B62)*100`

	x	44.54	ug/ml

5) Limit of Detection and Limit of Quantitation

Answer:

LOD= 3.3*S.D of Intercept / Slope

LOD	6.43	ug/ml

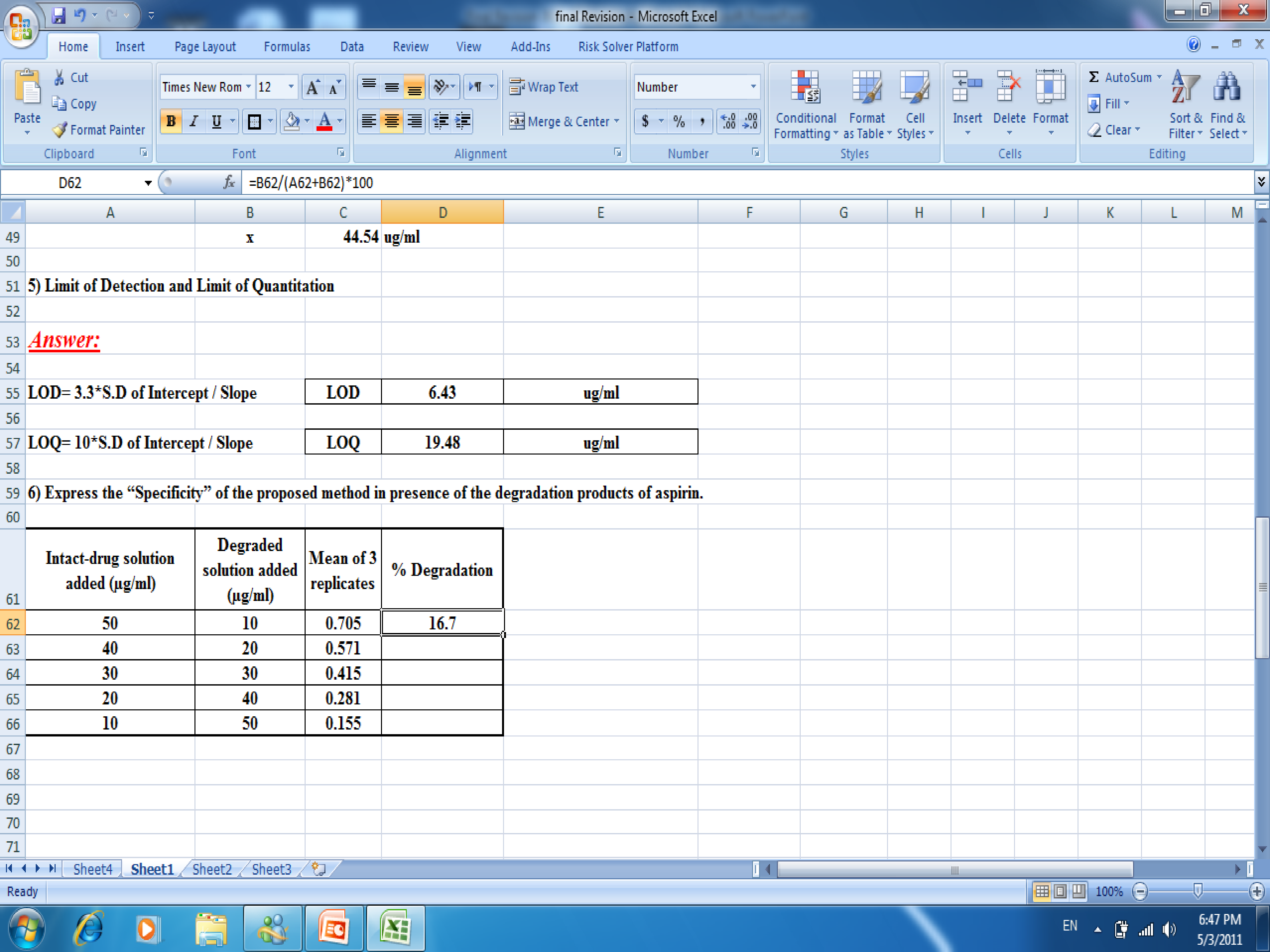
LOQ= 10*S.D of Intercept / Slope

LOQ	19.48	ug/ml

6) Express the “Specificity” of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates	% Degradation
50	10		=B62/(A62+B62)*100
40	20	0.571	
30	30	0.415	
20	40	0.281	
10	50	0.155	

=Degraded Solution added/(Intact drug Solution added+Degraded Solution added)*100



D62 =B62/(A62+B62)*100

x 44.54 ug/ml

5) Limit of Detection and Limit of Quantitation

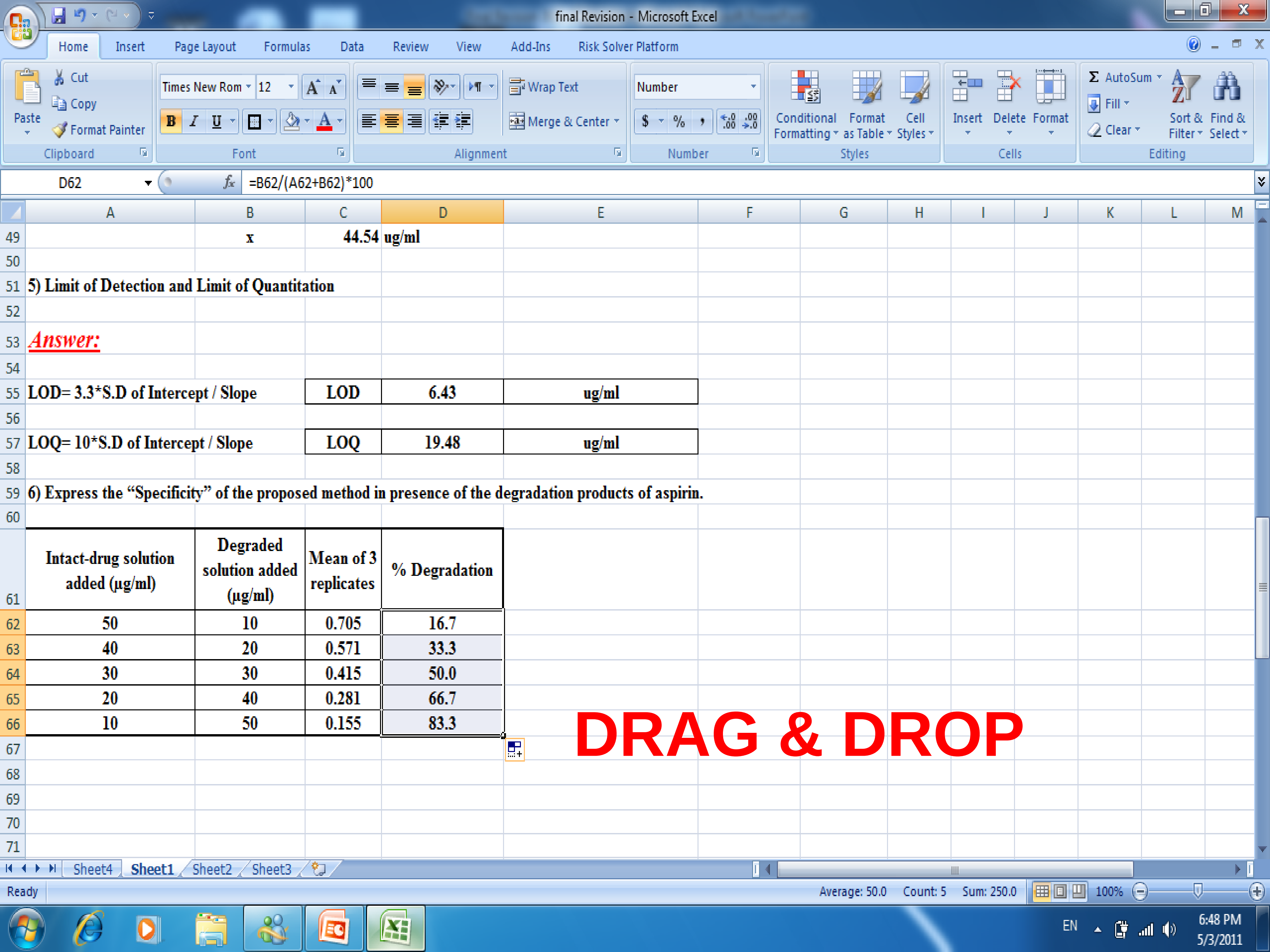
Answer:

LOD= 3.3*S.D of Intercept / Slope | LOD | 6.43 | ug/ml

LOQ= 10*S.D of Intercept / Slope | LOQ | 19.48 | ug/ml

6) Express the “Specificity” of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates	% Degradation
50	10	0.705	16.7
40	20	0.571	
30	30	0.415	
20	40	0.281	
10	50	0.155	



D62 =B62/(A62+B62)*100

x 44.54 ug/ml

5) Limit of Detection and Limit of Quantitation

Answer:

LOD= 3.3*S.D of Intercept / Slope	LOD	6.43	ug/ml
LOQ= 10*S.D of Intercept / Slope	LOQ	19.48	ug/ml

6) Express the "Specificity" of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates	% Degradation
50	10	0.705	16.7
40	20	0.571	33.3
30	30	0.415	50.0
20	40	0.281	66.7
10	50	0.155	83.3

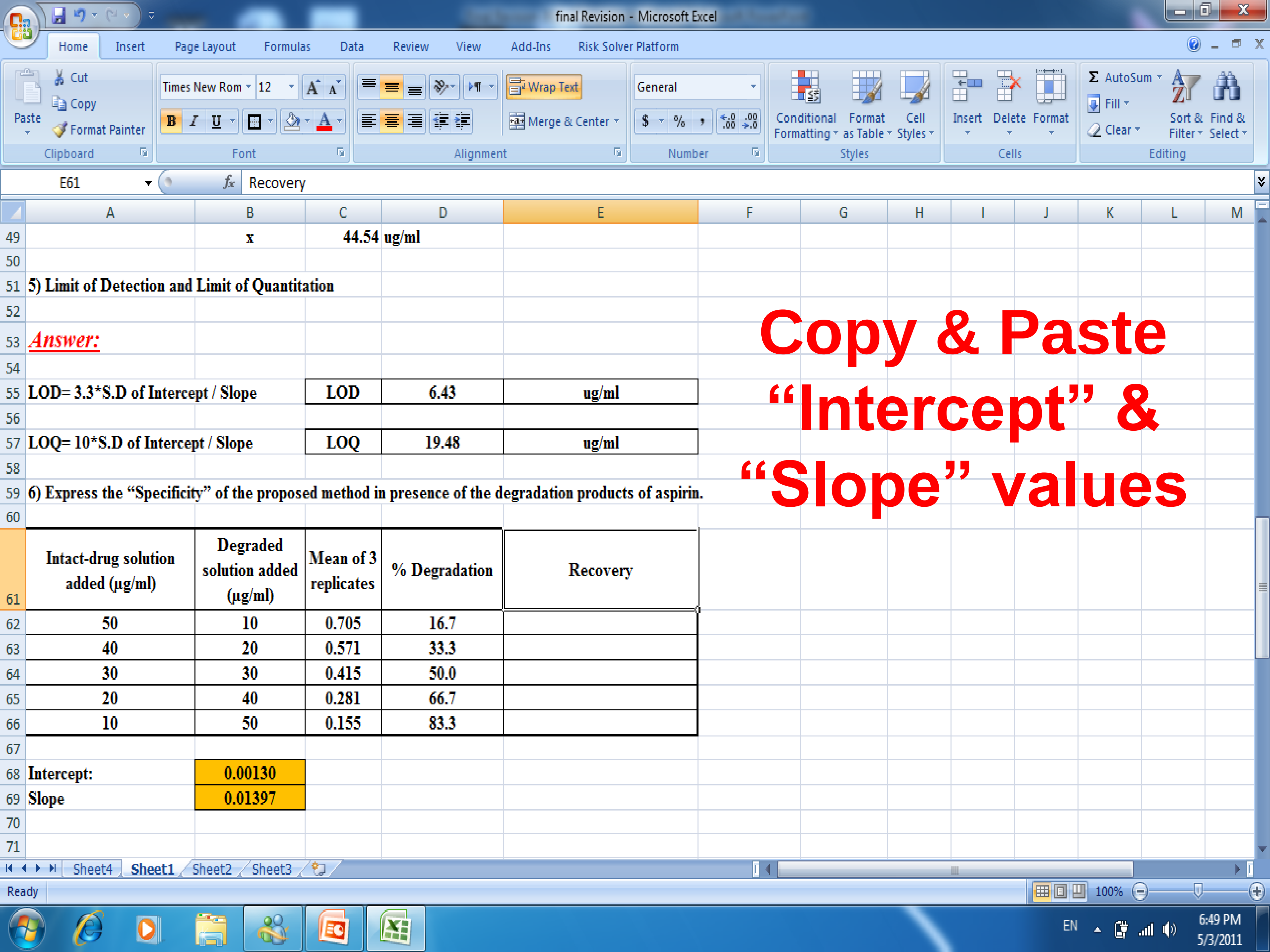
DRAG & DROP

How to calculate specificity?

- By mixing calculated volumes of the intact drug solution with calculated volume of the degraded solutions , to obtain laboratory prepared mixture solutions.
- The mixtures were analyzed in triplicate. The mean of the 3 readings is calculated, then:

2 - Recovery of the intact drug in each mixture is then calculated from equation of "Linear Regression".

Recovery = (Mean of the 3 readings – intercept)/slope



E61 fx Recovery

x 44.54 ug/ml

5) Limit of Detection and Limit of Quantitation

Answer:

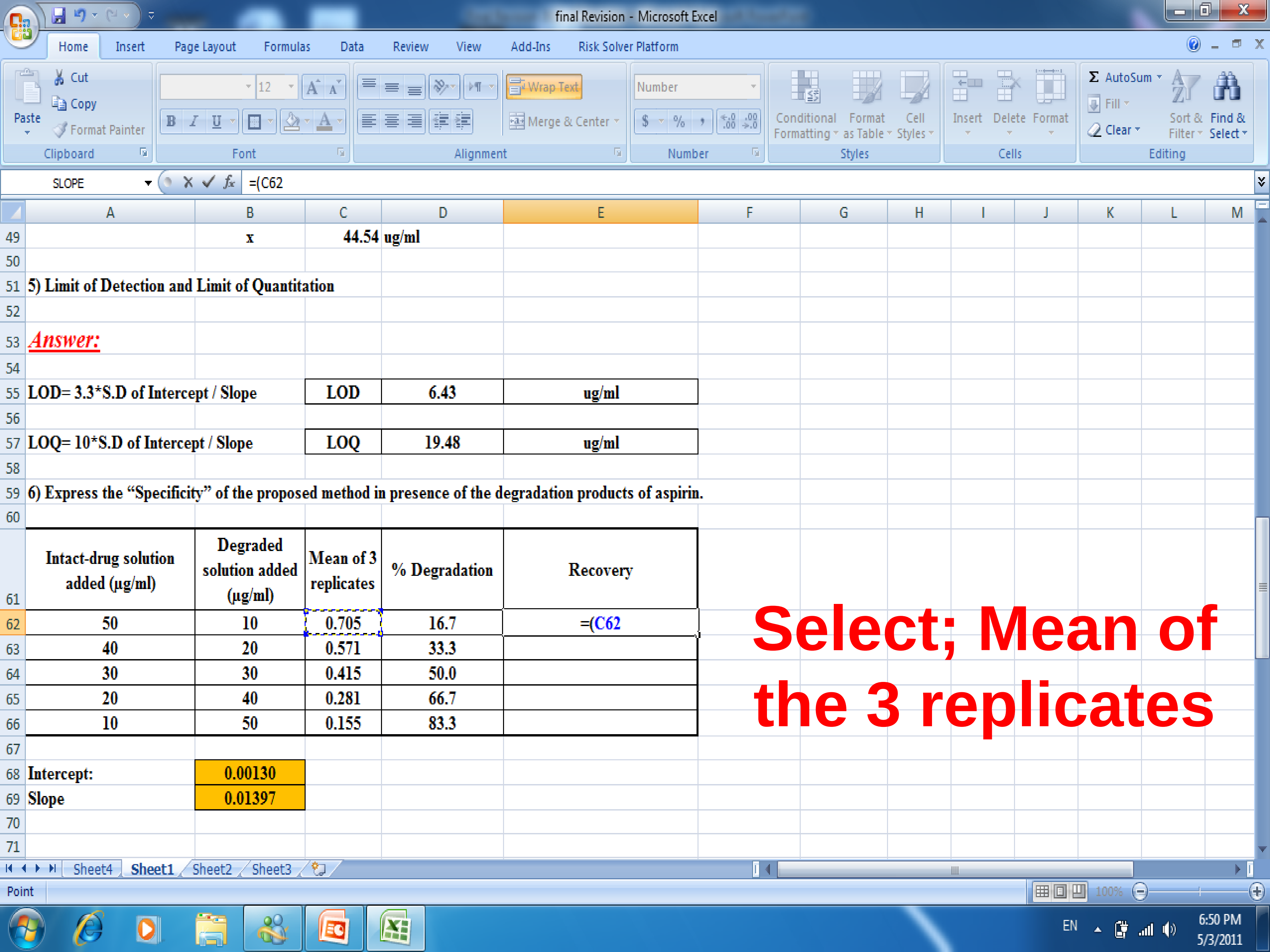
LOD= 3.3*S.D of Intercept / Slope	LOD	6.43	ug/ml
LOQ= 10*S.D of Intercept / Slope	LOQ	19.48	ug/ml

6) Express the "Specificity" of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates	% Degradation	Recovery
50	10	0.705	16.7	
40	20	0.571	33.3	
30	30	0.415	50.0	
20	40	0.281	66.7	
10	50	0.155	83.3	

Intercept:	0.00130
Slope	0.01397

Copy & Paste "Intercept" & "Slope" values



SLOPE =(C62

	x	44.54	ug/ml

5) Limit of Detection and Limit of Quantitation

Answer:

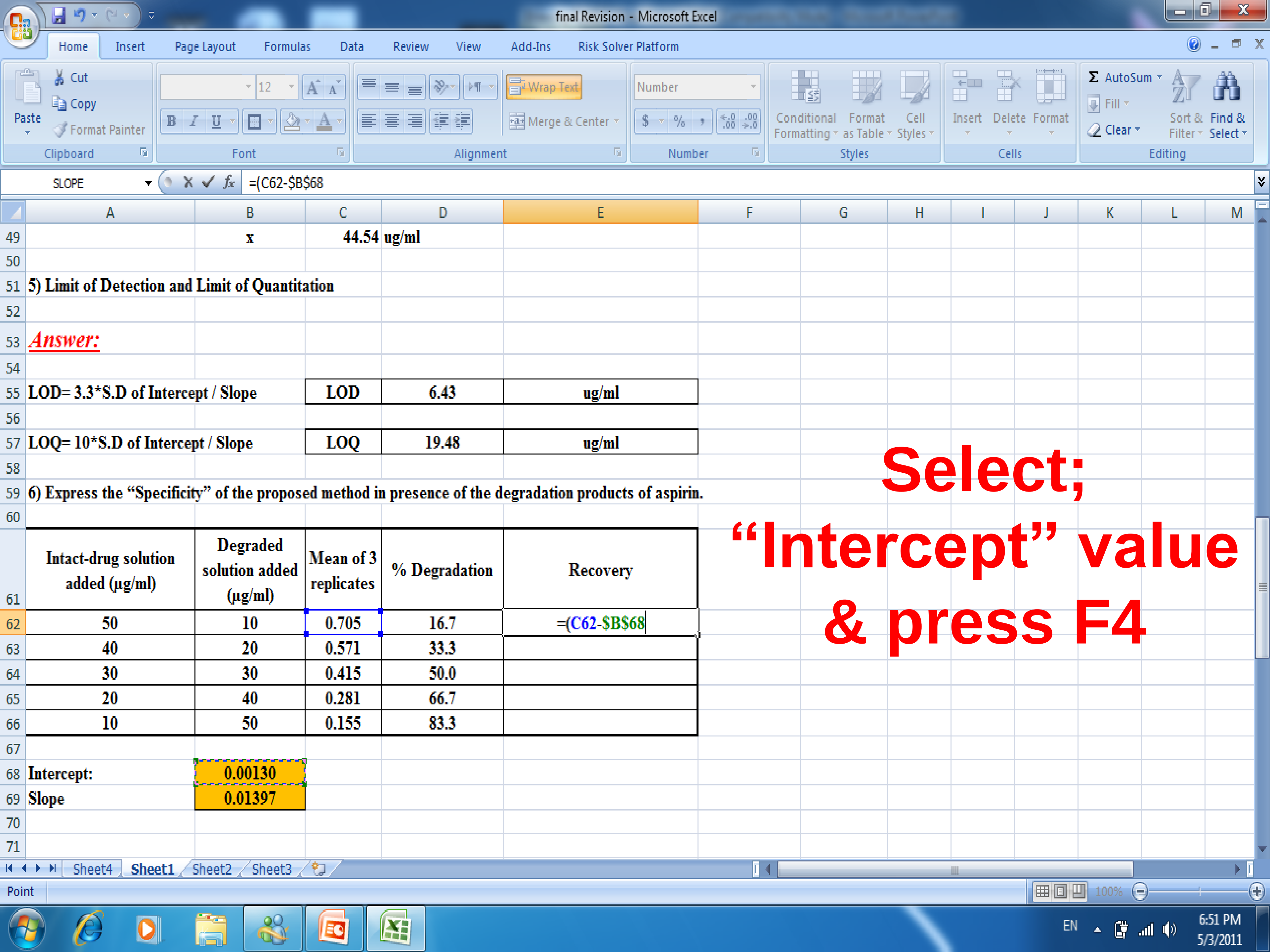
LOD= 3.3*S.D of Intercept / Slope	LOD	6.43	ug/ml
LOQ= 10*S.D of Intercept / Slope	LOQ	19.48	ug/ml

6) Express the “Specificity” of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (μg/ml)	Degraded solution added (μg/ml)	Mean of 3 replicates	% Degradation	Recovery
50	10	0.705	16.7	=(C62
40	20	0.571	33.3	
30	30	0.415	50.0	
20	40	0.281	66.7	
10	50	0.155	83.3	

Intercept:	0.00130
Slope	0.01397

Select; Mean of the 3 replicates



SLOPE =(C62-$B$68

x 44.54 ug/ml

5) Limit of Detection and Limit of Quantitation

Answer:

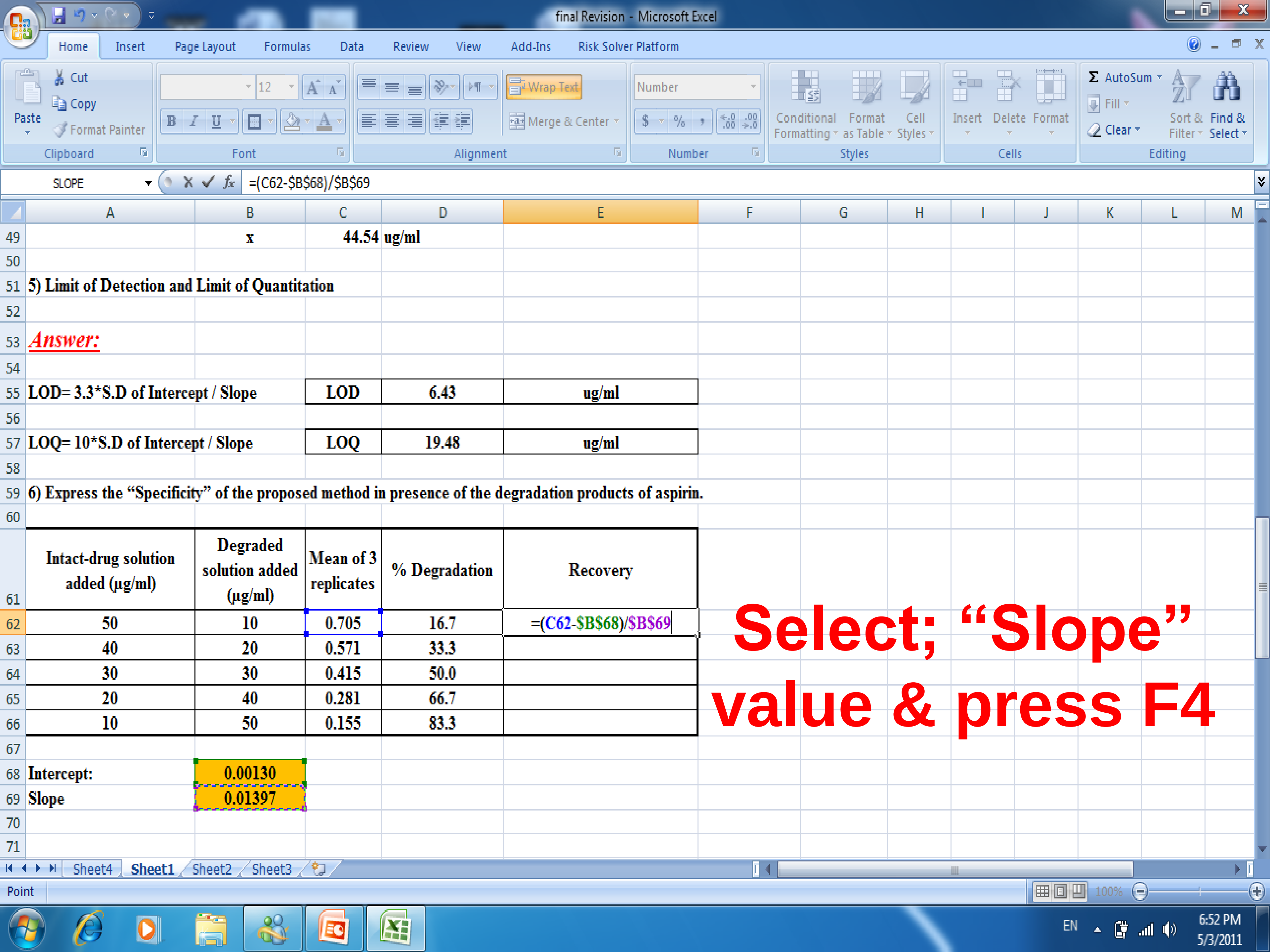
LOD= 3.3*S.D of Intercept / Slope	LOD	6.43	ug/ml
LOQ= 10*S.D of Intercept / Slope	LOQ	19.48	ug/ml

6) Express the “Specificity” of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates	% Degradation	Recovery
50	10	0.705	16.7	=(C62-$B$68
40	20	0.571	33.3	
30	30	0.415	50.0	
20	40	0.281	66.7	
10	50	0.155	83.3	

Intercept:	0.00130
Slope	0.01397

Select; “Intercept” value & press F4



=(C62-$B$68)/$B$69

x 44.54 ug/ml

5) Limit of Detection and Limit of Quantitation

Answer:

LOD= 3.3*S.D of Intercept / Slope

LOD	6.43	ug/ml

LOQ= 10*S.D of Intercept / Slope

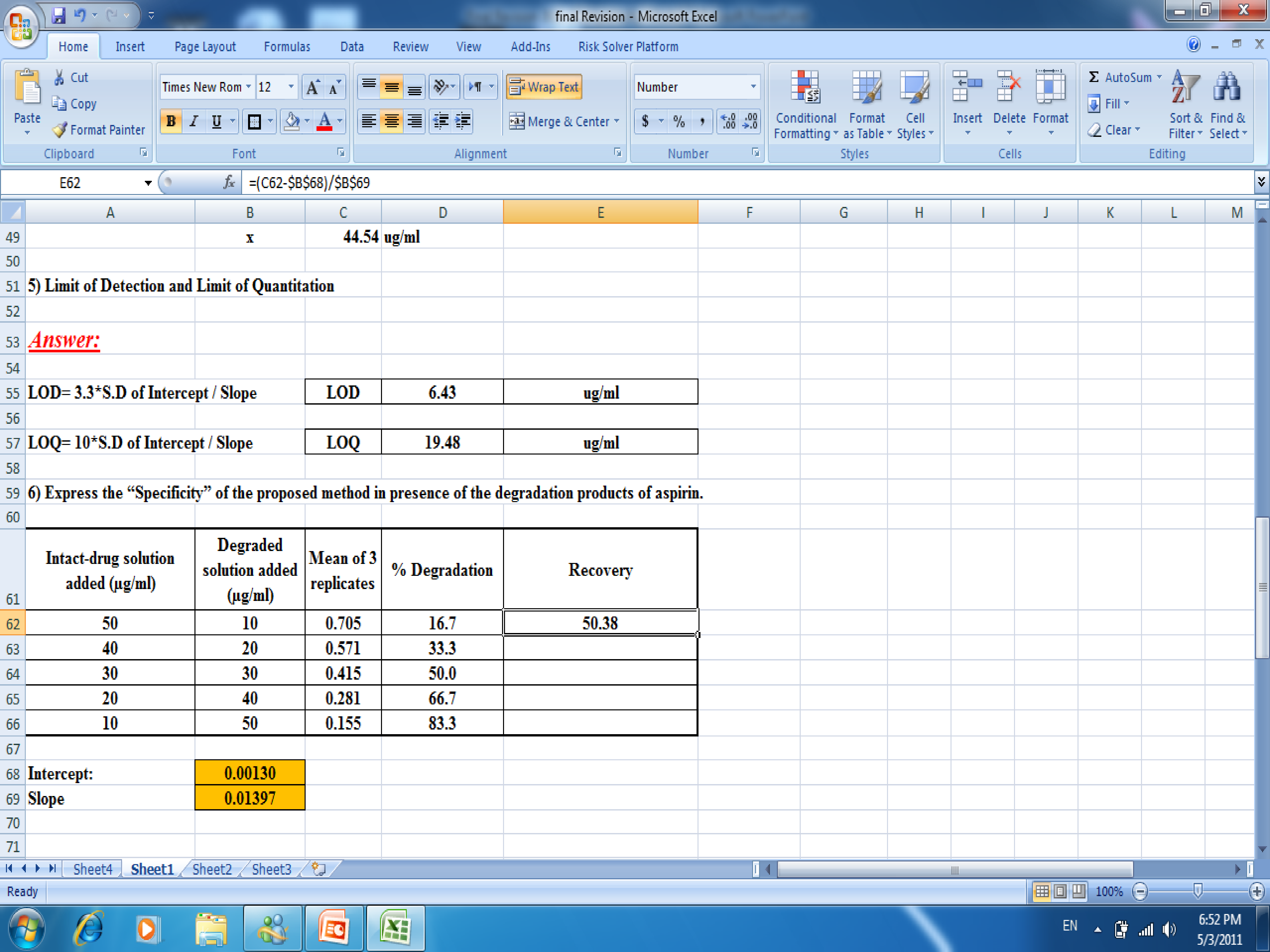
LOQ	19.48	ug/ml

6) Express the "Specificity" of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates	% Degradation	Recovery
50	10	0.705	16.7	=(C62-$B$68)/$B$69
40	20	0.571	33.3	
30	30	0.415	50.0	
20	40	0.281	66.7	
10	50	0.155	83.3	

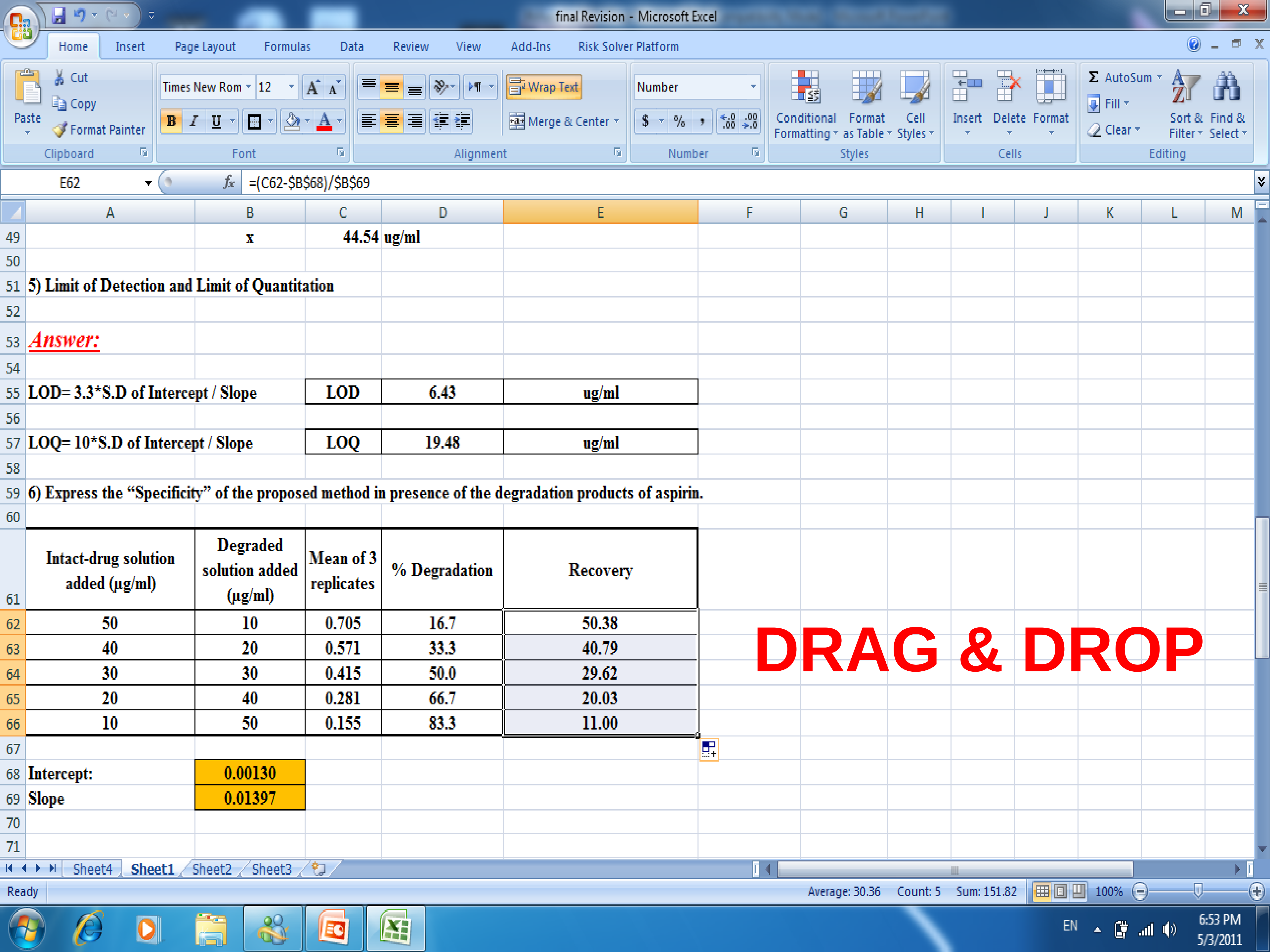
Intercept:	0.00130
Slope	0.01397

Select; "Slope" value & press F4



E62 =(C62-$B$68)/$B$69

	A	B	C	D	E
49		x	44.54	ug/ml	
50					
51	5) Limit of Detection and Limit of Quantitation				
52					
53	*Answer:*				
54					
55	LOD= 3.3*S.D of Intercept / Slope		LOD	6.43	ug/ml
56					
57	LOQ= 10*S.D of Intercept / Slope		LOQ	19.48	ug/ml
58					
59	6) Express the "Specificity" of the proposed method in presence of the degradation products of aspirin.				
60					
61	Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates	% Degradation	Recovery
62	50	10	0.705	16.7	50.38
63	40	20	0.571	33.3	
64	30	30	0.415	50.0	
65	20	40	0.281	66.7	
66	10	50	0.155	83.3	
67					
68	Intercept:	0.00130			
69	Slope	0.01397			
70					
71					



E62 =(C62-$B$68)/$B$69

x 44.54 ug/ml

5) Limit of Detection and Limit of Quantitation

Answer:

LOD= 3.3*S.D of Intercept / Slope	LOD	6.43	ug/ml
LOQ= 10*S.D of Intercept / Slope	LOQ	19.48	ug/ml

6) Express the "Specificity" of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates	% Degradation	Recovery
50	10	0.705	16.7	50.38
40	20	0.571	33.3	40.79
30	30	0.415	50.0	29.62
20	40	0.281	66.7	20.03
10	50	0.155	83.3	11.00

Intercept:	0.00130
Slope	0.01397

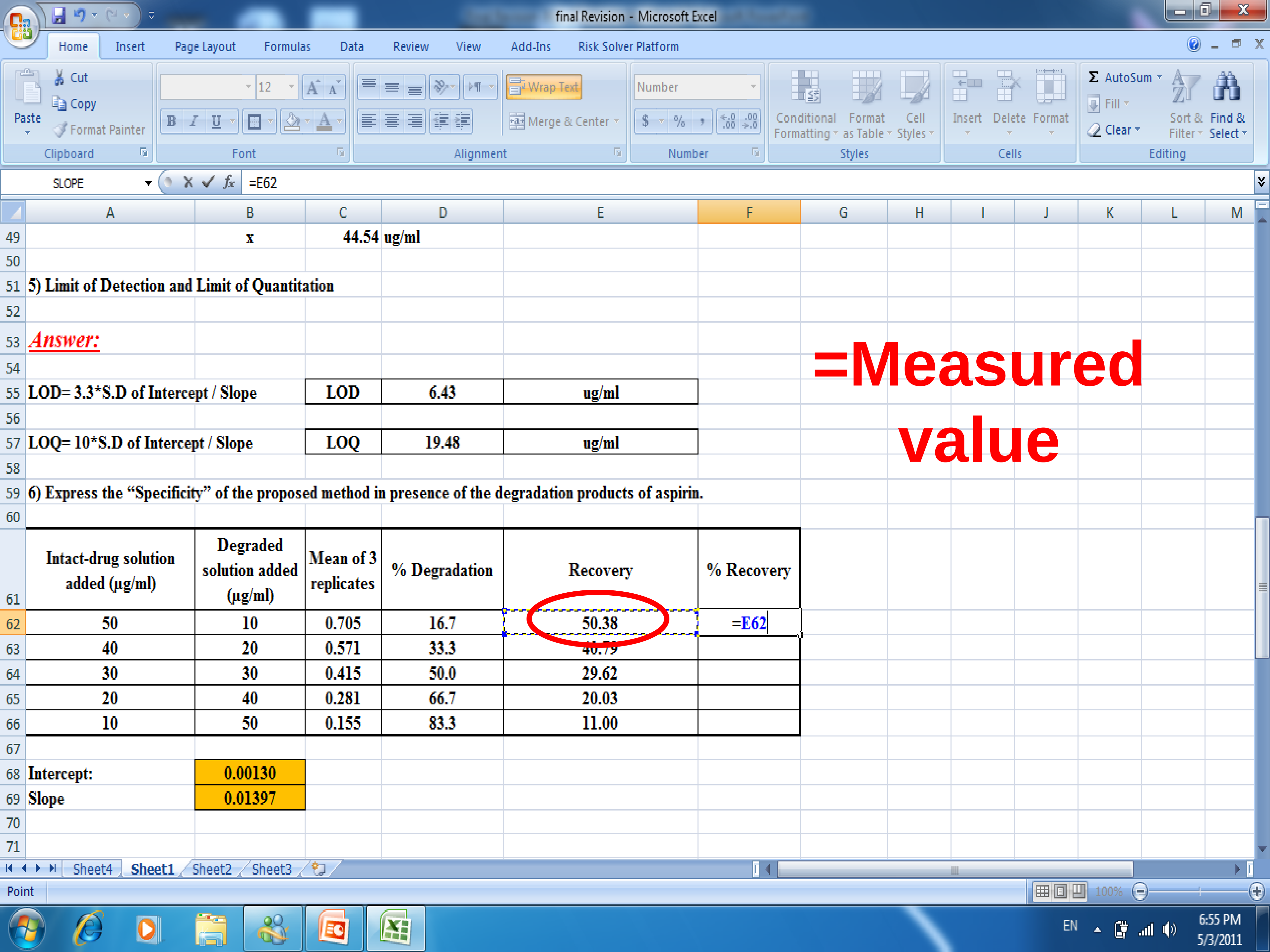
DRAG & DROP

How to calculate specificity?

- By mixing calculated volumes of the intact drug solution with calculated volume of the degraded solutions , to obtain laboratory prepared mixture solutions.
- The mixtures were analyzed in triplicate. The mean of the 3 readings is calculated, then:

3 - % Recovery is then calculated

% Recovery = Measured value/True value*100



x	44.54	ug/ml

5) Limit of Detection and Limit of Quantitation

Answer:

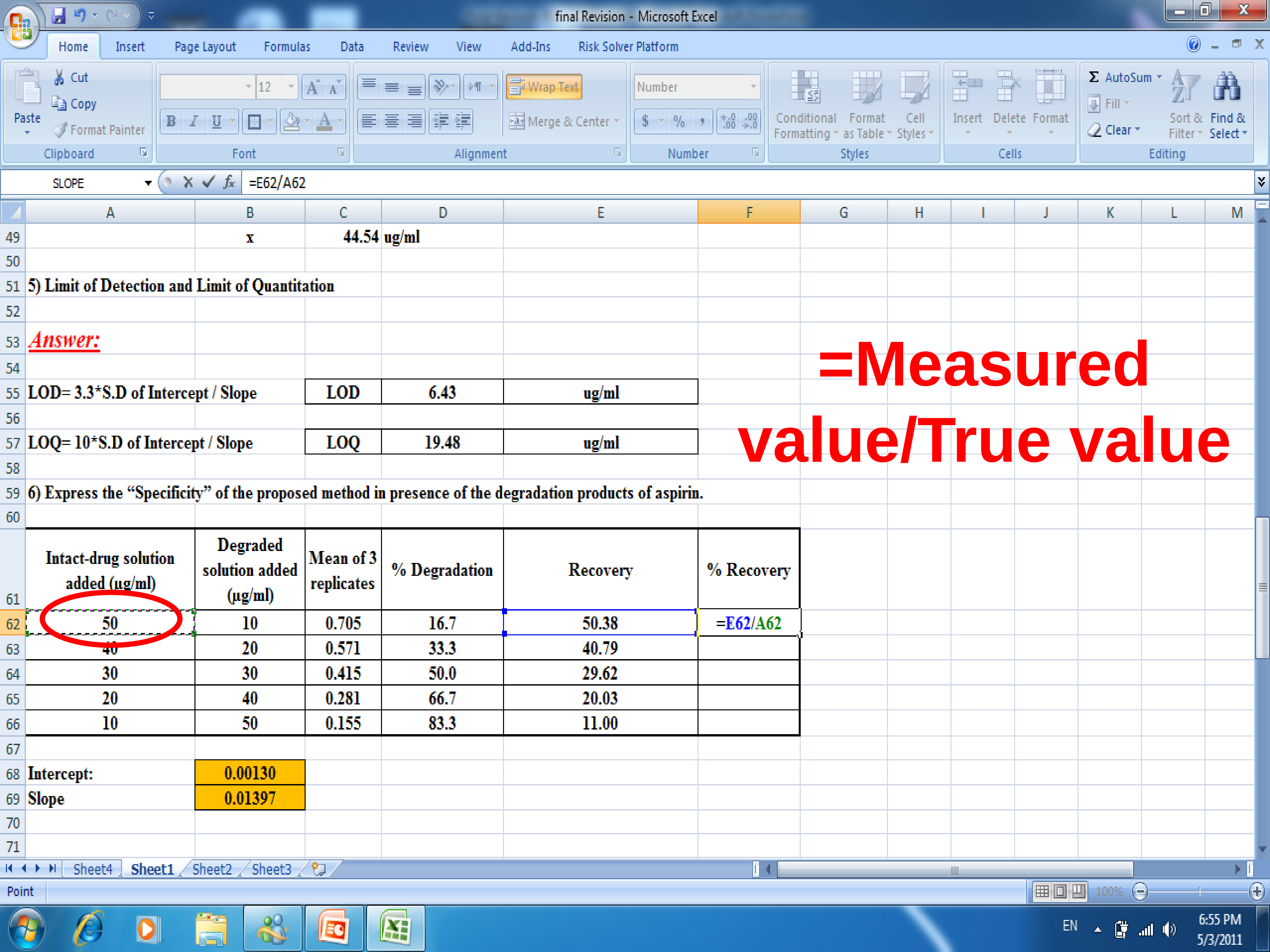
LOD= 3.3*S.D of Intercept / Slope	LOD	6.43	ug/ml
LOQ= 10*S.D of Intercept / Slope	LOQ	19.48	ug/ml

6) Express the "Specificity" of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates	% Degradation	Recovery	% Recovery
50	10	0.705	16.7	50.38	=E62
40	20	0.571	33.3	40.79	
30	30	0.415	50.0	29.62	
20	40	0.281	66.7	20.03	
10	50	0.155	83.3	11.00	

Intercept:	0.00130
Slope	0.01397

=Measured value



SLOPE =E62/A62

x 44.54 ug/ml

5) Limit of Detection and Limit of Quantitation

Answer:

LOD= 3.3*S.D of Intercept / Slope

LOD	6.43	ug/ml

LOQ= 10*S.D of Intercept / Slope

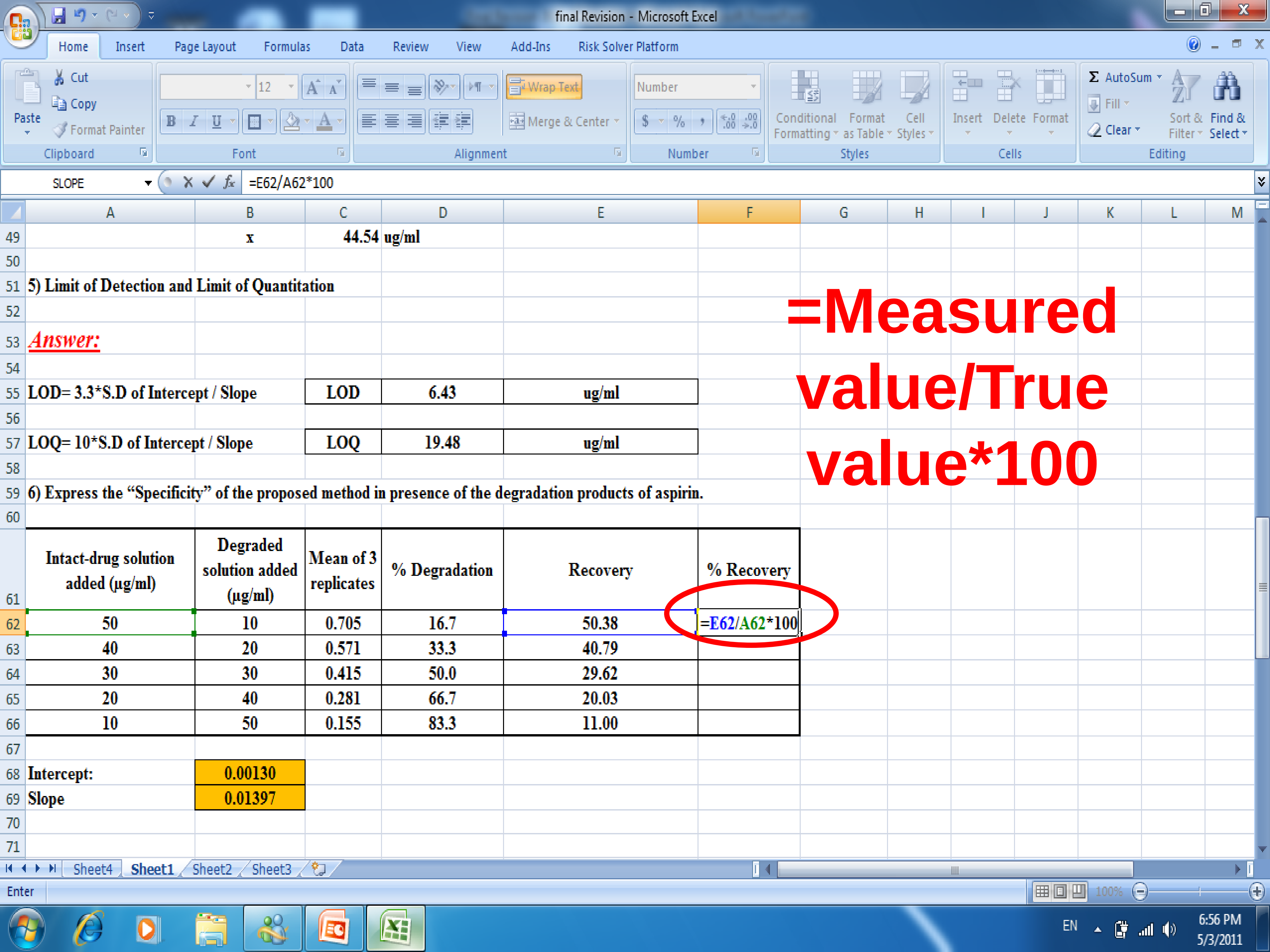
LOQ	19.48	ug/ml

=Measured value/True value

6) Express the "Specificity" of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (ug/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates	% Degradation	Recovery	% Recovery
50	10	0.705	16.7	50.38	=E62/A62
40	20	0.571	33.3	40.79	
30	30	0.415	50.0	29.62	
20	40	0.281	66.7	20.03	
10	50	0.155	83.3	11.00	

Intercept:	0.00130
Slope	0.01397



SLOPE =E62/A62*100

x 44.54 ug/ml

5) Limit of Detection and Limit of Quantitation

Answer:

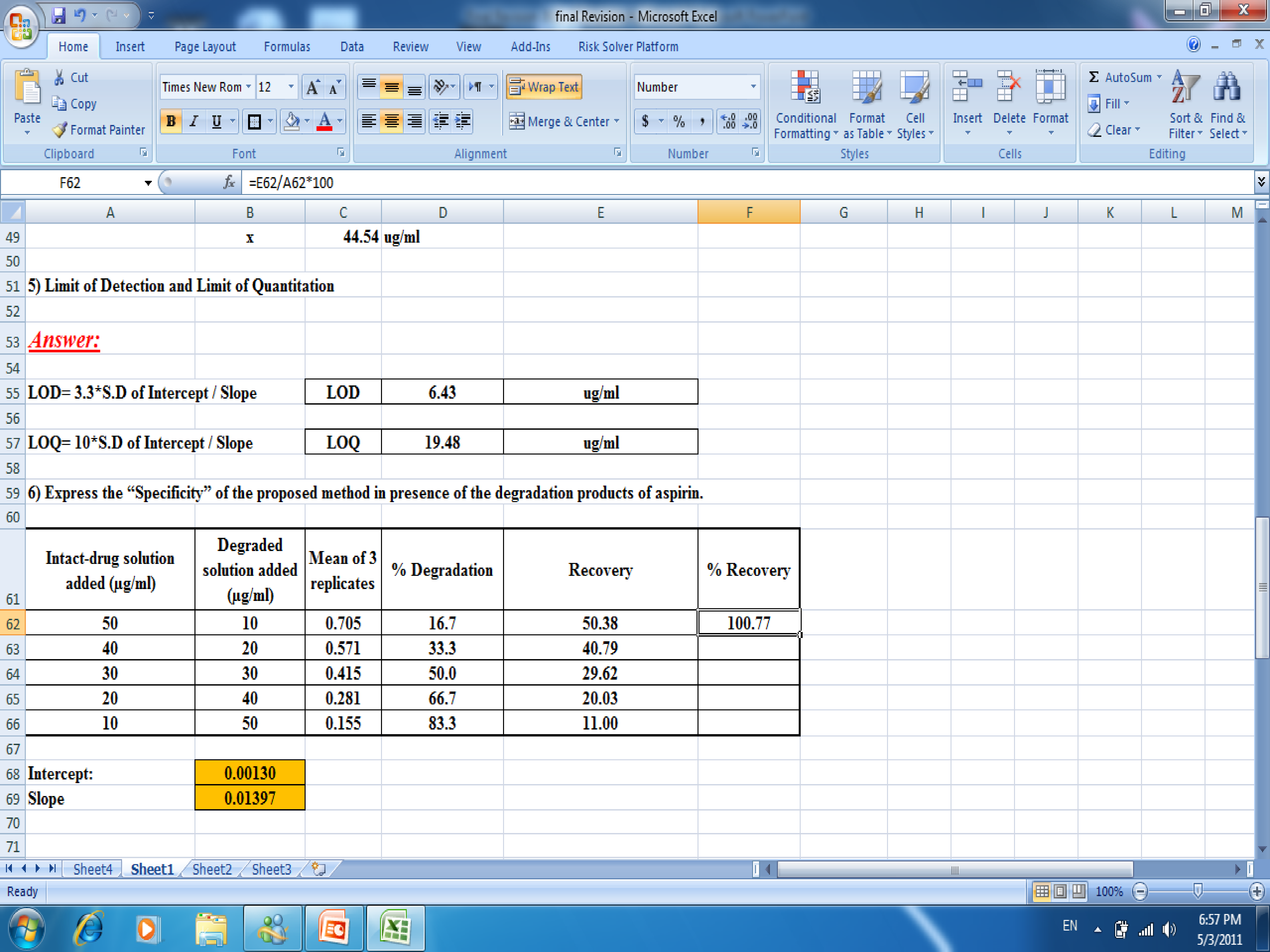
LOD= 3.3*S.D of Intercept / Slope	LOD	6.43	ug/ml
LOQ= 10*S.D of Intercept / Slope	LOQ	19.48	ug/ml

6) Express the "Specificity" of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates	% Degradation	Recovery	% Recovery
50	10	0.705	16.7	50.38	=E62/A62*100
40	20	0.571	33.3	40.79	
30	30	0.415	50.0	29.62	
20	40	0.281	66.7	20.03	
10	50	0.155	83.3	11.00	

Intercept:	0.00130
Slope	0.01397

=Measured value/True value*100



F62 =E62/A62*100

x 44.54 ug/ml

5) Limit of Detection and Limit of Quantitation

Answer:

LOD= 3.3*S.D of Intercept / Slope

LOD	6.43	ug/ml

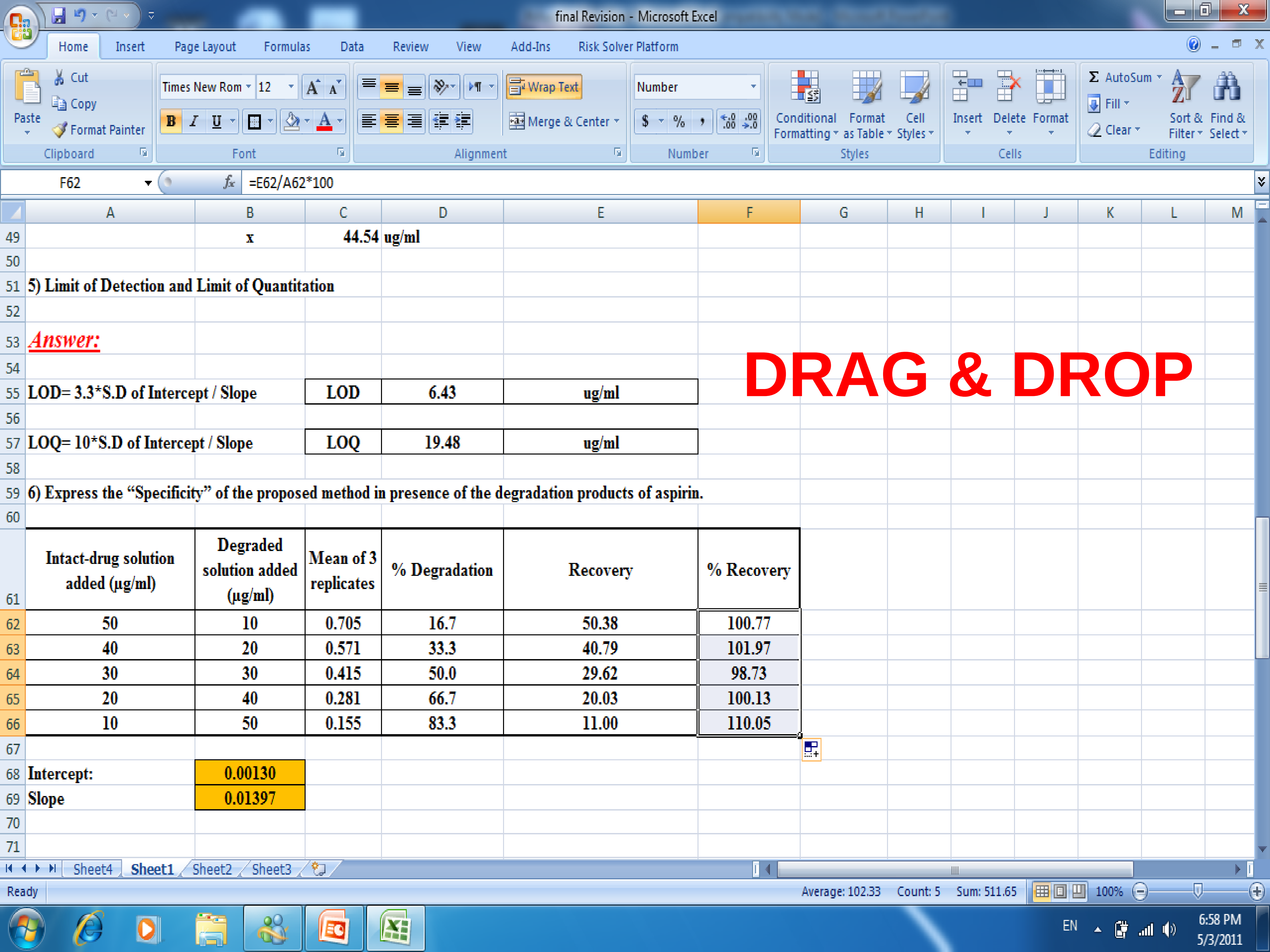
LOQ= 10*S.D of Intercept / Slope

LOQ	19.48	ug/ml

6) Express the “Specificity” of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates	% Degradation	Recovery	% Recovery
50	10	0.705	16.7	50.38	100.77
40	20	0.571	33.3	40.79	
30	30	0.415	50.0	29.62	
20	40	0.281	66.7	20.03	
10	50	0.155	83.3	11.00	

Intercept:	0.00130
Slope	0.01397



F62 =E62/A62*100

	x	44.54 ug/ml

5) Limit of Detection and Limit of Quantitation

Answer:

LOD= 3.3*S.D of Intercept / Slope	LOD	6.43	ug/ml
LOQ= 10*S.D of Intercept / Slope	LOQ	19.48	ug/ml

DRAG & DROP

6) Express the "Specificity" of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates	% Degradation	Recovery	% Recovery
50	10	0.705	16.7	50.38	100.77
40	20	0.571	33.3	40.79	101.97
30	30	0.415	50.0	29.62	98.73
20	40	0.281	66.7	20.03	100.13
10	50	0.155	83.3	11.00	110.05

Intercept:	0.00130
Slope	0.01397

Average: 102.33 Count: 5 Sum: 511.65

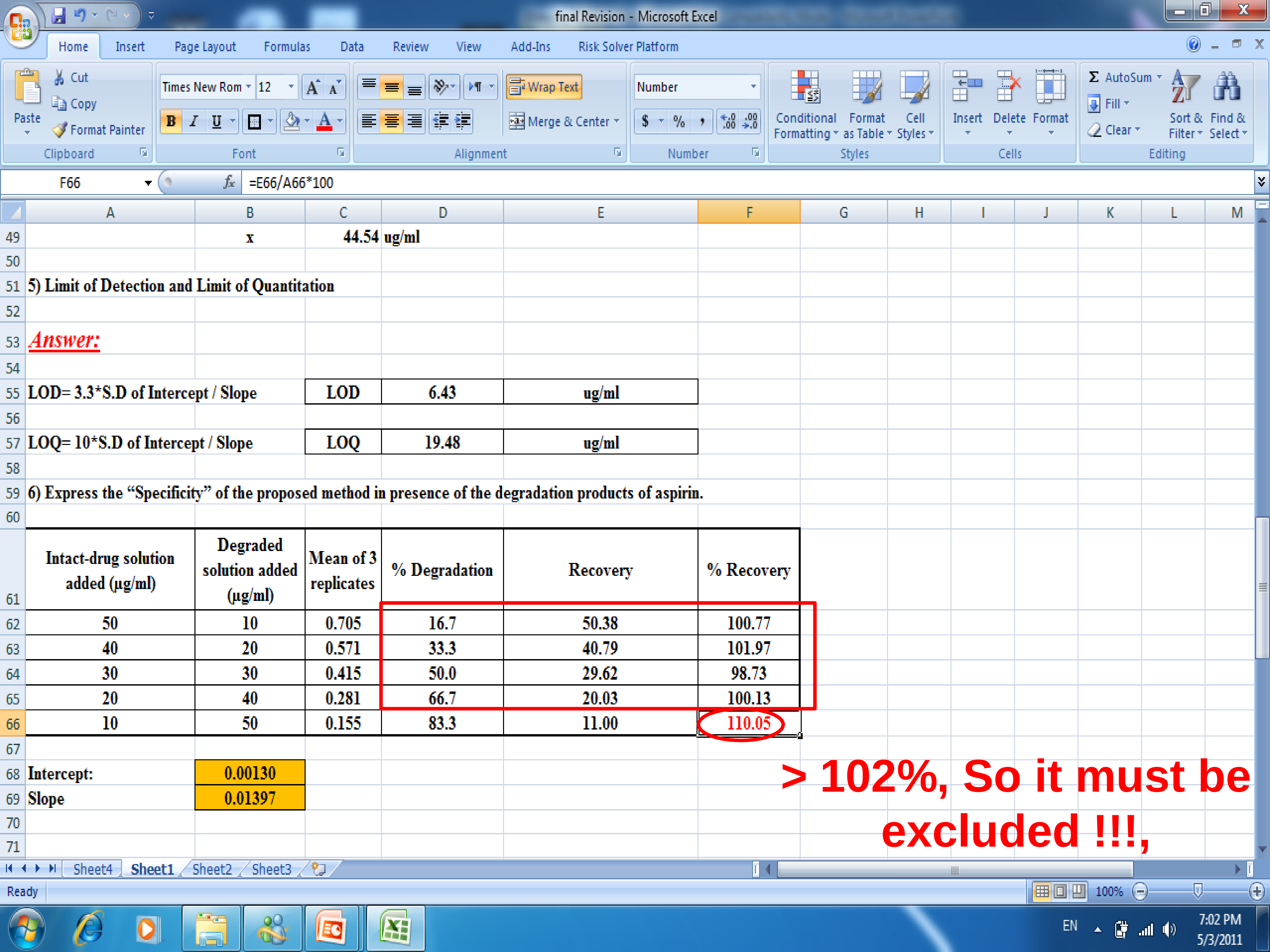
How to calculate specificity?

- By mixing calculated volumes of the intact drug solution with calculated volume of the degraded solutions , to obtain laboratory prepared mixture solutions.
- The mixtures were analyzed in triplicate. The mean of the 3 readings is calculated, then:

4 – Detect the specificity limit of the method from the % recovery which must be between (98%-102%).

i.e.: if up to 66.7 % degradation % R ranges between (98%-102%) while at 83.3 % degradation % R (> 102%).

Then, the method is said to be specific in presence of up to 66.7 % degradation ONLY.



F66 =E66/A66*100

x 44.54 ug/ml

5) Limit of Detection and Limit of Quantitation

Answer:

LOD= 3.3*S.D of Intercept / Slope	LOD	6.43	ug/ml
LOQ= 10*S.D of Intercept / Slope	LOQ	19.48	ug/ml

6) Express the "Specificity" of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates	% Degradation	Recovery	% Recovery
50	10	0.705	16.7	50.38	100.77
40	20	0.571	33.3	40.79	101.97
30	30	0.415	50.0	29.62	98.73
20	40	0.281	66.7	20.03	100.13
10	50	0.155	83.3	11.00	110.05

Intercept:	0.00130
Slope	0.01397

> 102%, So it must be excluded !!!,

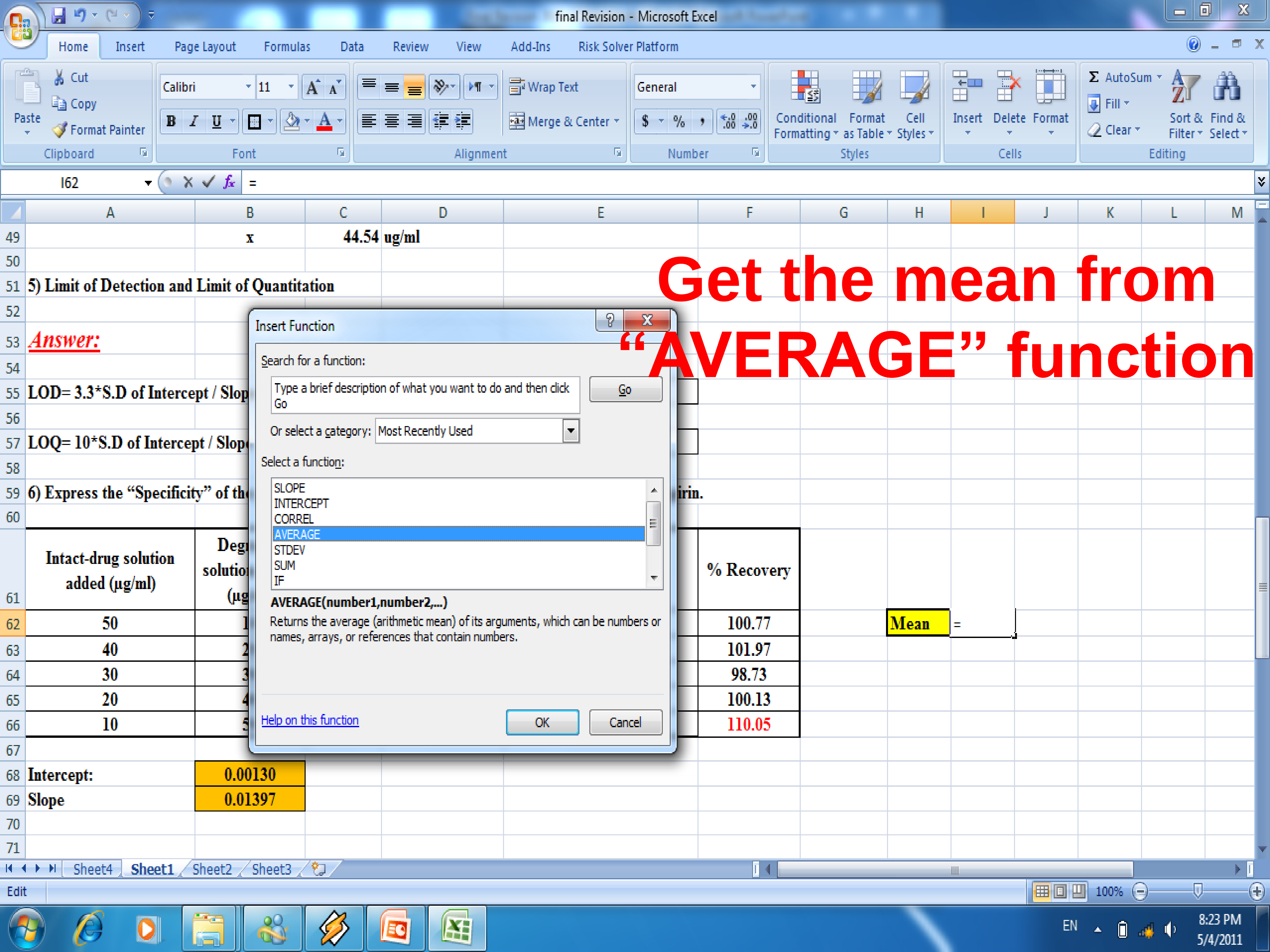
How to calculate specificity?

- By mixing calculated volumes of the intact drug solution with calculated volume of the degraded solutions , to obtain laboratory prepared mixture solutions.
- The mixtures were analyzed in triplicate. The mean of the 3 readings is calculated, then:

5 – Mean of % R and the RSD are calculated.

- **Mean of % R = Average of % R of mixtures (here, up to 66.7 % degradation**

Get the mean from "AVERAGE" function



I62 =

	A	B	C	D
49		x	44.54	ug/ml
51	5) Limit of Detection and Limit of Quantitation			
53	*Answer:*			
55	LOD= 3.3*S.D of Intercept / Slop			
57	LOQ= 10*S.D of Intercept / Slop			
59	6) Express the "Specificity" of th			

Row 59 (continued): irin.

Intact-drug solution added (µg/ml)	Degr solutio (µg	% Recovery
50	1	100.77
40	2	101.97
30	3	98.73
20	4	100.13
10	5	110.05

Intercept:	0.00130
Slope	0.01397

Mean =

Insert Function

Search for a function:

Type a brief description of what you want to do and then click Go

Go

Or select a category: Most Recently Used

Select a function:

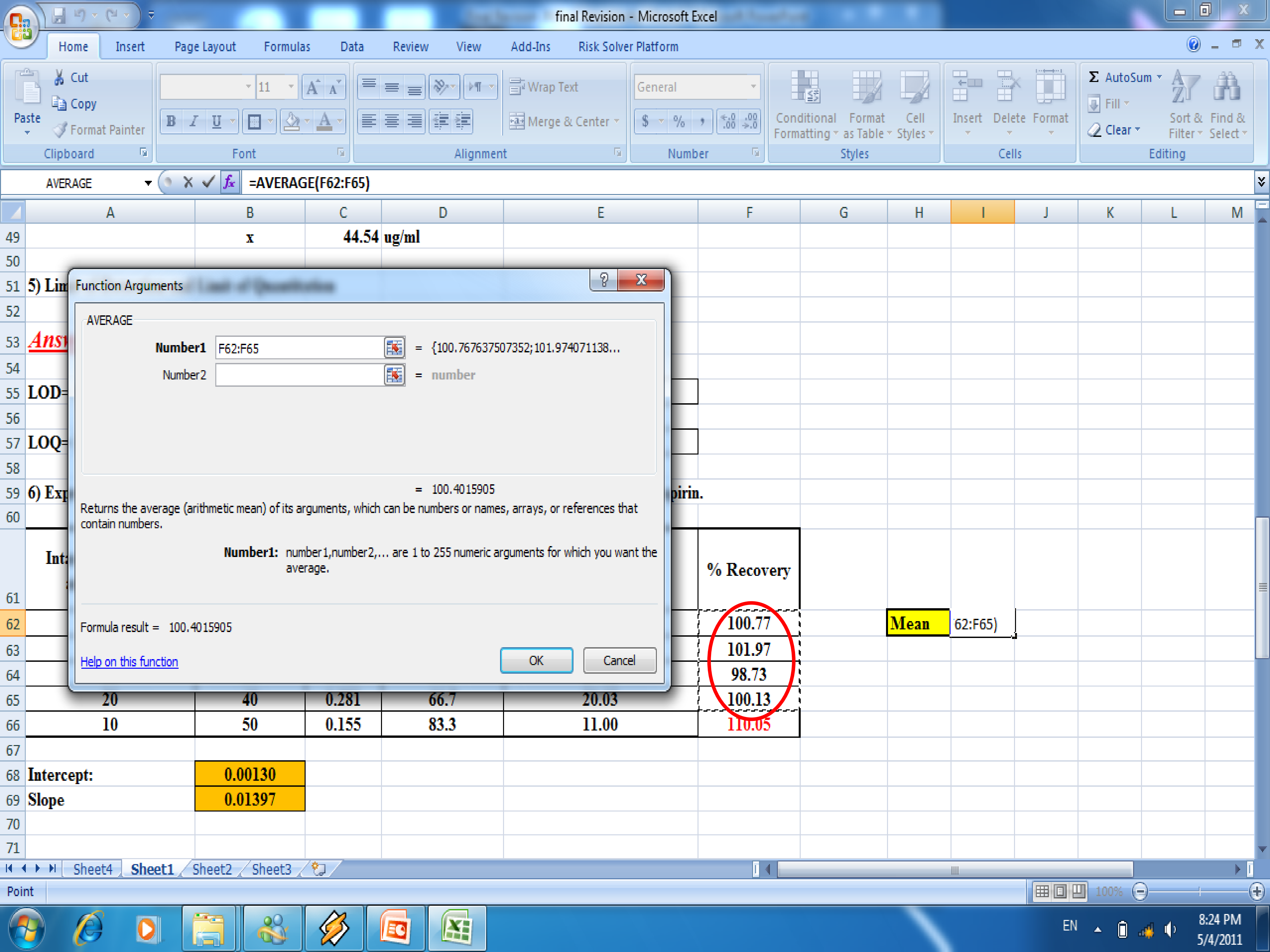
- SLOPE
- INTERCEPT
- CORREL
- AVERAGE
- STDEV
- SUM
- IF

AVERAGE(number1,number2,...)

Returns the average (arithmetic mean) of its arguments, which can be numbers or names, arrays, or references that contain numbers.

Help on this function

OK Cancel



AVERAGE

=AVERAGE(F62:F65)

x 44.54 ug/ml

5) Lim

Ans

LOD=

LOQ=

6) Exp ... pirin.

Function Arguments

AVERAGE

Number1 F62:F65 = {100.767637507352;101.974071138...

Number2 = number

= 100.4015905

Returns the average (arithmetic mean) of its arguments, which can be numbers or names, arrays, or references that contain numbers.

Number1: number1,number2,... are 1 to 255 numeric arguments for which you want the average.

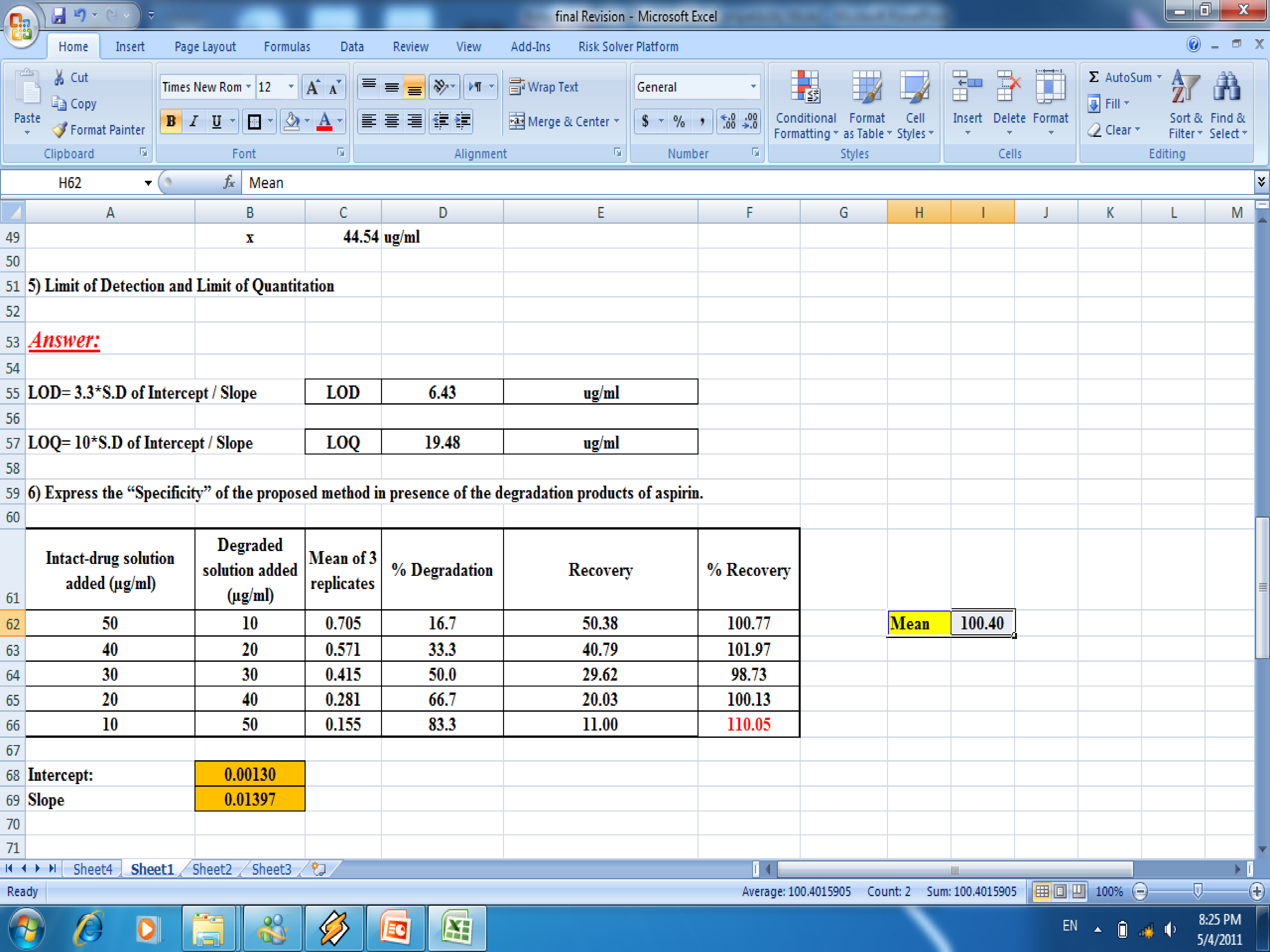
Formula result = 100.4015905

Help on this function

OK

Cancel

	A	B	C	D	E	F	G	H	I
61	Int					% Recovery			
62						100.77		Mean	62:F65)
63						101.97			
64						98.73			
65	20	40	0.281	66.7	20.03	100.13			
66	10	50	0.155	83.3	11.00	110.05			
67									
68	Intercept:	0.00130							
69	Slope	0.01397							



H62 fx Mean

	x	44.54	ug/ml

5) Limit of Detection and Limit of Quantitation

Answer:

LOD= 3.3*S.D of Intercept / Slope	**LOD**	**6.43**	**ug/ml**
LOQ= 10*S.D of Intercept / Slope	**LOQ**	**19.48**	**ug/ml**

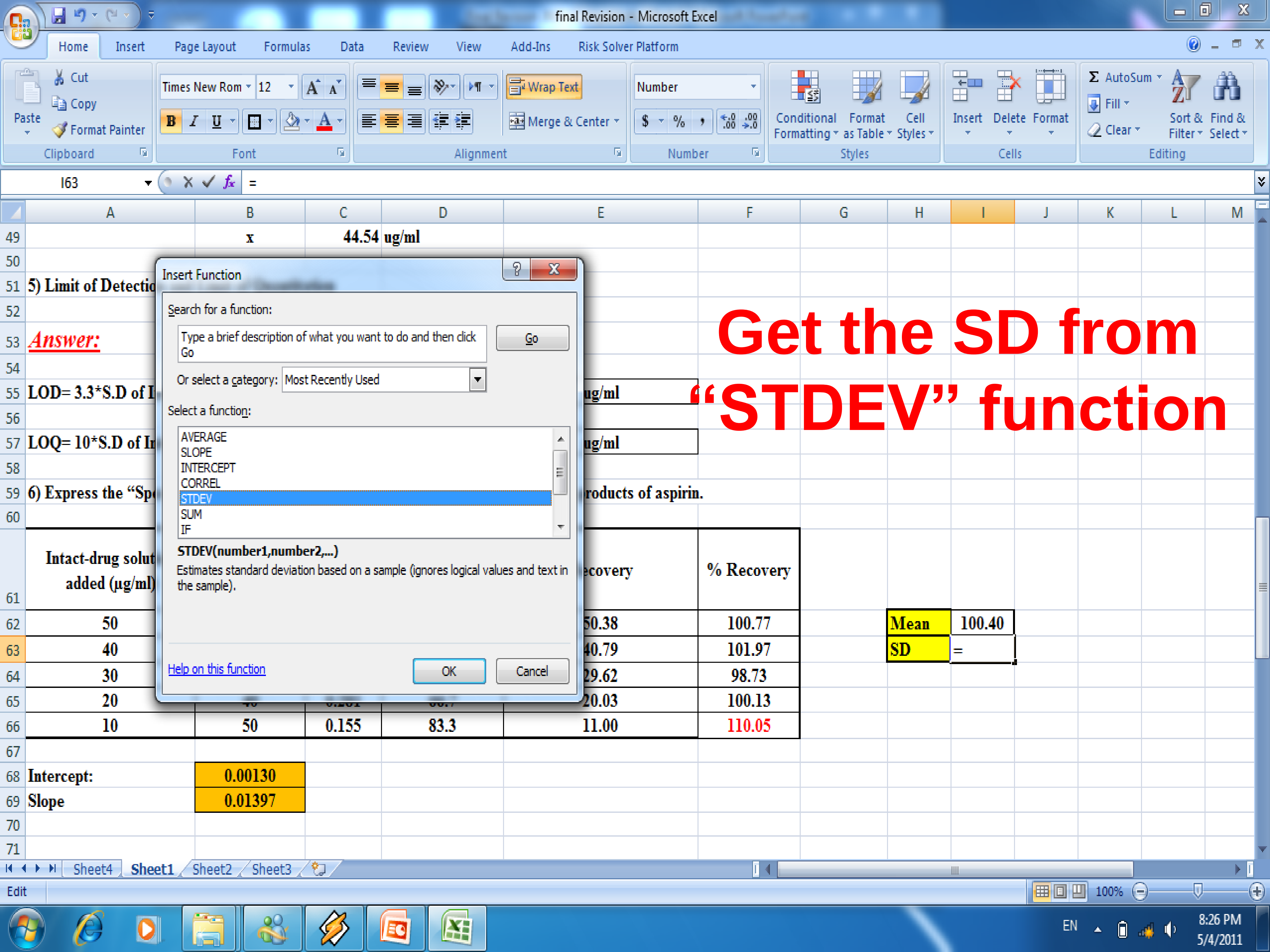
6) Express the "Specificity" of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (µg/ml)	Degraded solution added (µg/ml)	Mean of 3 replicates	% Degradation	Recovery	% Recovery
50	10	0.705	16.7	50.38	100.77
40	20	0.571	33.3	40.79	101.97
30	30	0.415	50.0	29.62	98.73
20	40	0.281	66.7	20.03	100.13
10	50	0.155	83.3	11.00	110.05

Mean	100.40

Intercept:	0.00130
Slope	0.01397

Average: 100.4015905 Count: 2 Sum: 100.4015905



Get the SD from "STDEV" function

Formula bar (cell I63): =

Row 49: x 44.54 ug/ml

5) Limit of Detectio

Answer:

LOD= 3.3*S.D of I … **ug/ml**

LOQ= 10*S.D of In … **ug/ml**

6) Express the "Sp … **roducts of aspirin.**

Intact-drug solut added (µg/ml)				ecovery	% Recovery
50				50.38	100.77
40				40.79	101.97
30				29.62	98.73
20				20.03	100.13
10	50	0.155	83.3	11.00	110.05

Mean	100.40
SD	=

Intercept:	0.00130
Slope	0.01397

Insert Function

Search for a function:

Type a brief description of what you want to do and then click Go

Go

Or select a category: Most Recently Used

Select a function:

- AVERAGE
- SLOPE
- INTERCEPT
- CORREL
- STDEV
- SUM
- IF

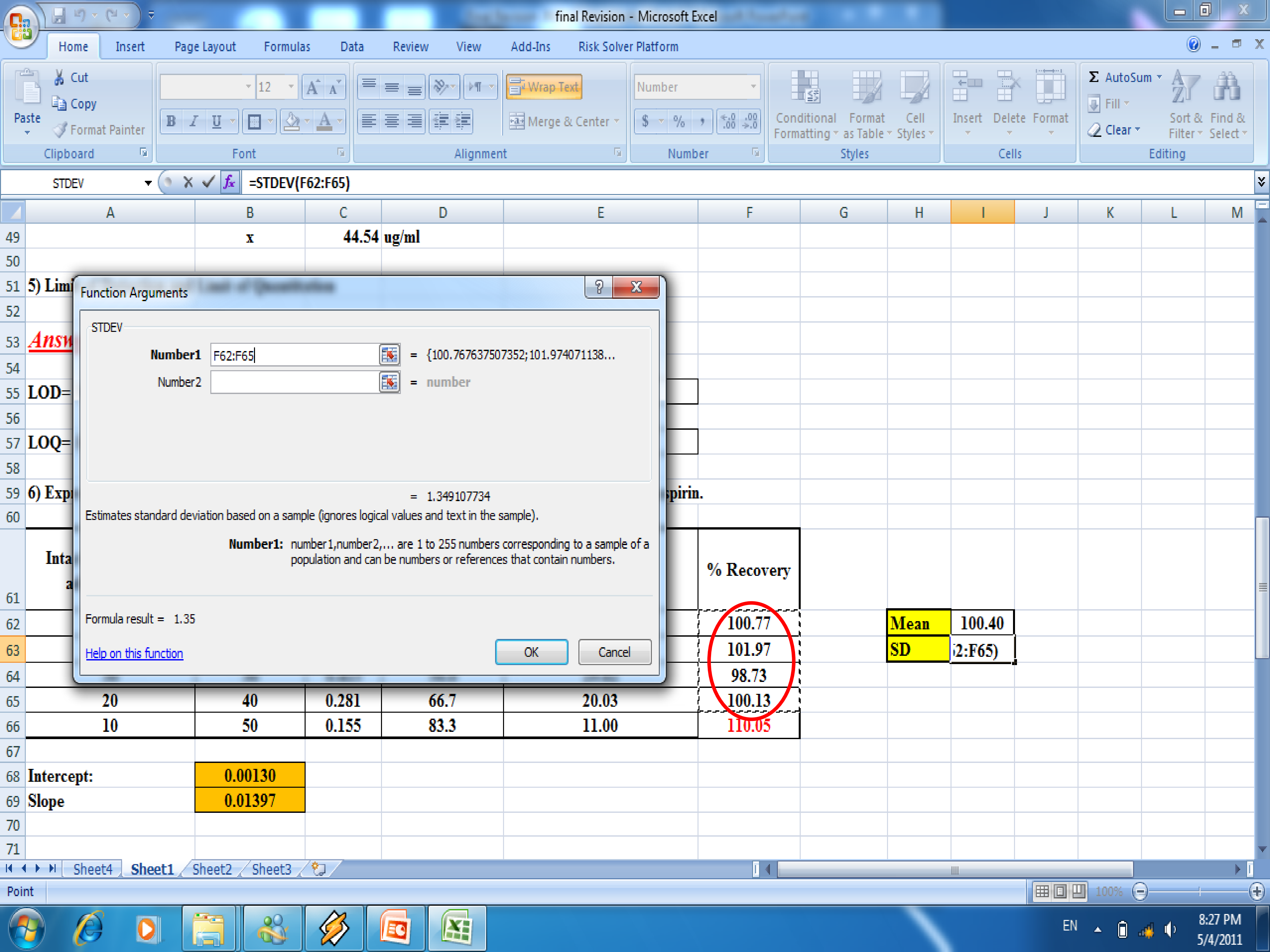
STDEV(number1,number2,...)

Estimates standard deviation based on a sample (ignores logical values and text in the sample).

Help on this function

OK

Cancel



STDEV =STDEV(F62:F65)

Row	A	B	C	D	E	F	G	H	I
49		x	44.54	ug/ml					
51	5) Limi								
53	Answ								
55	LOD=								
57	LOQ=								
59	6) Exp				spirin.				
61	Inta a					% Recovery			
62						100.77		Mean	100.40
63						101.97		SD	:2:F65)
64						98.73			
65	20	40	0.281	66.7	20.03	100.13			
66	10	50	0.155	83.3	11.00	110.05			
68	Intercept:	0.00130							
69	Slope	0.01397							

Function Arguments

STDEV

Number1 F62:F65 = {100.767637507352;101.974071138...

Number2 = number

= 1.349107734

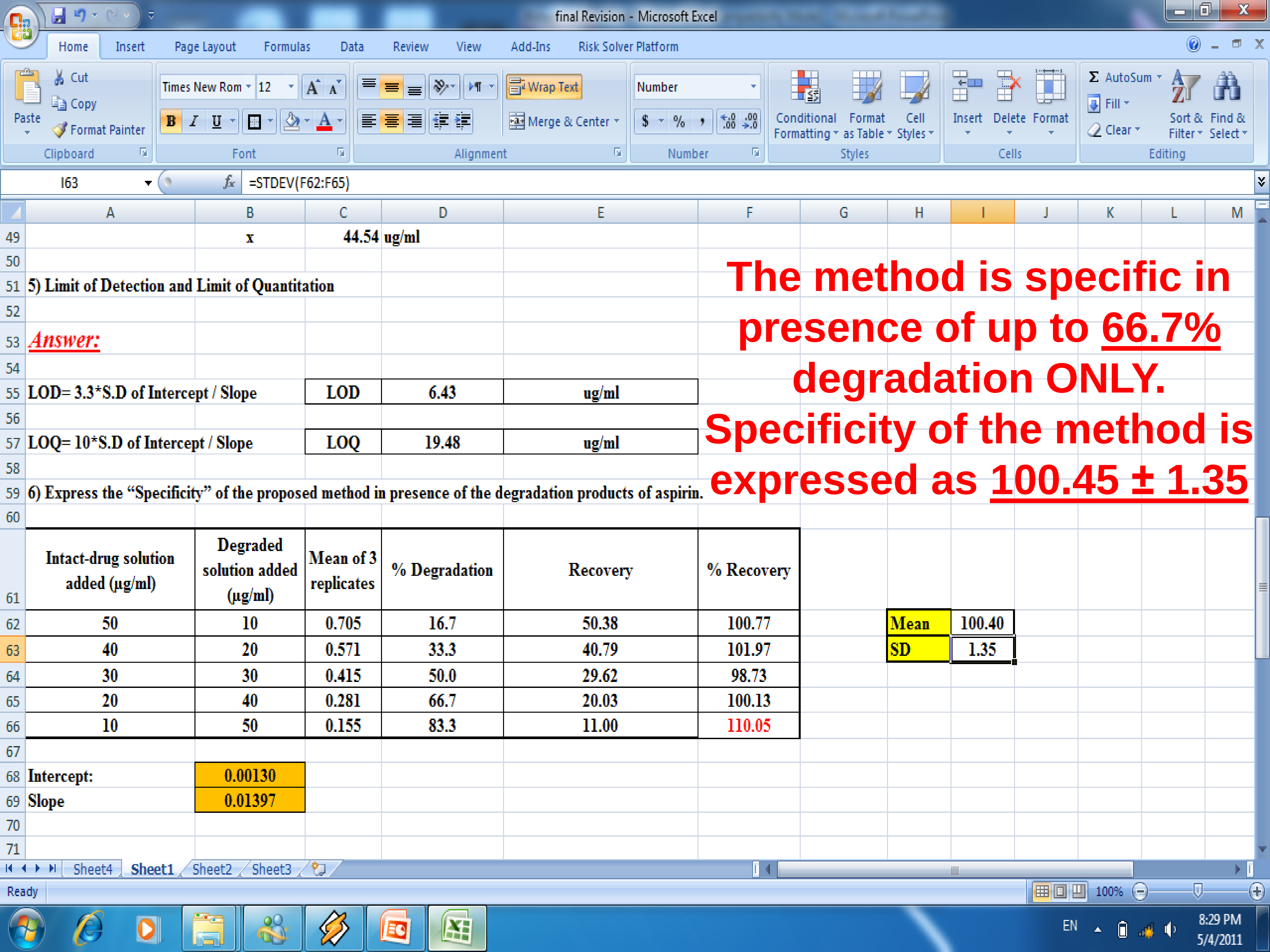
Estimates standard deviation based on a sample (ignores logical values and text in the sample).

Number1: number1,number2,... are 1 to 255 numbers corresponding to a sample of a population and can be numbers or references that contain numbers.

Formula result = 1.35

Help on this function

OK Cancel



I63 =STDEV(F62:F65)

x 44.54 ug/ml

5) Limit of Detection and Limit of Quantitation

Answer:

LOD= 3.3*S.D of Intercept / Slope	LOD	6.43	ug/ml
LOQ= 10*S.D of Intercept / Slope	LOQ	19.48	ug/ml

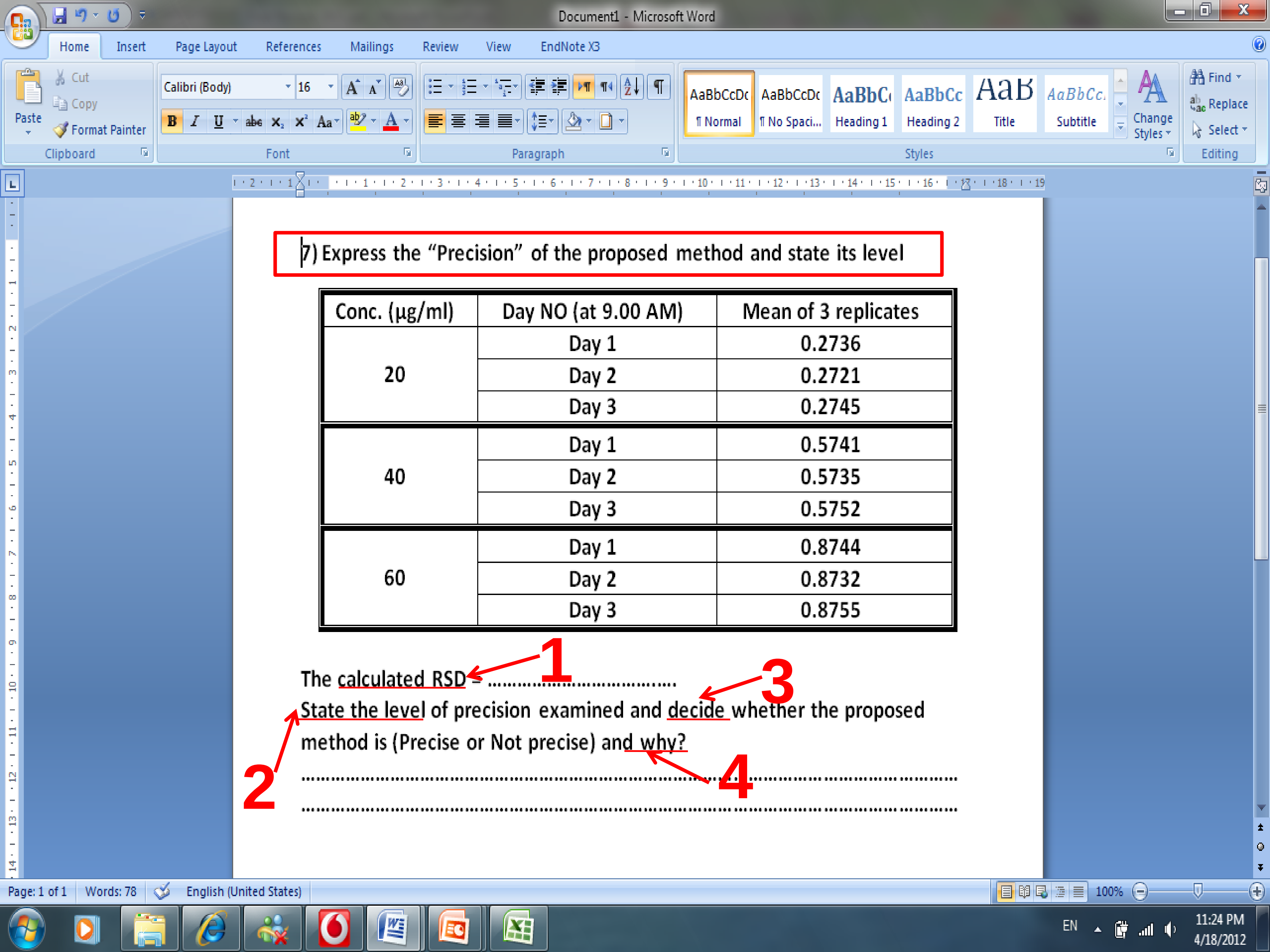
6) Express the "Specificity" of the proposed method in presence of the degradation products of aspirin.

Intact-drug solution added (μg/ml)	Degraded solution added (μg/ml)	Mean of 3 replicates	% Degradation	Recovery	% Recovery
50	10	0.705	16.7	50.38	100.77
40	20	0.571	33.3	40.79	101.97
30	30	0.415	50.0	29.62	98.73
20	40	0.281	66.7	20.03	100.13
10	50	0.155	83.3	11.00	110.05

Mean	100.40
SD	1.35

Intercept:	0.00130
Slope	0.01397

The method is specific in presence of up to 66.7% degradation ONLY. Specificity of the method is expressed as 100.45 ± 1.35



7) Express the "Precision" of the proposed method and state its level

Conc. (µg/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates
20	Day 1	0.2736
	Day 2	0.2721
	Day 3	0.2745
40	Day 1	0.5741
	Day 2	0.5735
	Day 3	0.5752
60	Day 1	0.8744
	Day 2	0.8732
	Day 3	0.8755

The calculated RSD = ………………………………

State the level of precision examined and decide whether the proposed method is (Precise or Not precise) and why?

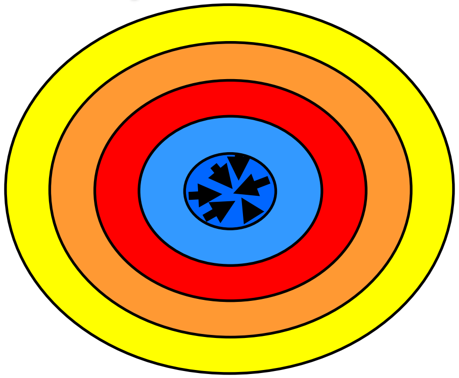
……

……

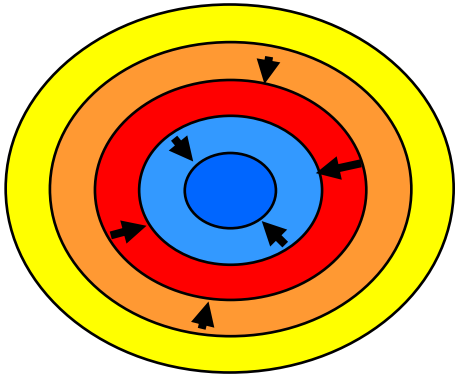
• Accuracy and precision

-***Accuracy:*** **expresses the closeness of agreement between the value which is accepted either as a conventional true value or an accepted reference value and the value found.**

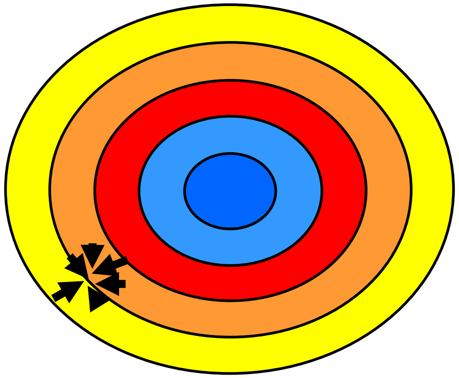
-***Precision:*** **expresses the closeness of agreement between a series of measurements obtained from multiple sampling of the same homogenous sample under normal operational conditions.**



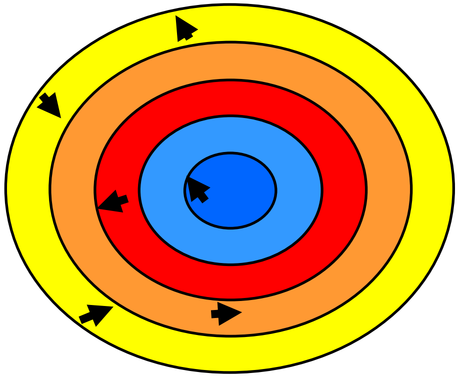
Accurate
&
precise



Accurate
&
imprecise



Inaccurate
&
precise



Inaccurate
&
imprecise

- ***Precision***

Precision may be considered at three levels

- **Repeatability** (intra-assay precision)

  One analyst conducting multiple replicates of the same sample, on the same day using the same equipment, and applying the method as written.

- **Intermediate Precision** (variability within a laboratory)

  Expresses within-laboratories variations (different days, different analysts, different equipment etc.)

- **Reproducibility** (precision between laboratories)

  Expresses the precision between laboratories

Precision

- The ICH requires precision from at least 9 replications covering the complete specified range. For example, the results can be obtained at 3 concentrations with 3 replicates at each concentration.

- It is expressed as the Relative Standard Deviation (RSD)

$$RSD = \frac{SD}{\tilde{X}} \times 100$$

Precision may be considered at three levels

- **Repeatability** (intra-assay precision) **(RSD % ≤ 2)**
- **Intermediate Precision** (variability within a laboratory) **(RSD % ≤ 4)**
- **Reproducibility** (precision between laboratories) **(RSD % ≤ 4)**

How to calculate precision?

- If the specified range is 10 – 70 µg/ml, then we can choose 3 concentration levels; close to the quantitation limit (20 µg/ml) , one in the middle of the range (40 µg/ml) and one at the high end of the calibration curve (60 µg/ml). Then;

1 – Each concentration will be analyzed in 3 replicates (the mean of the 3 replicates is calculated) at:

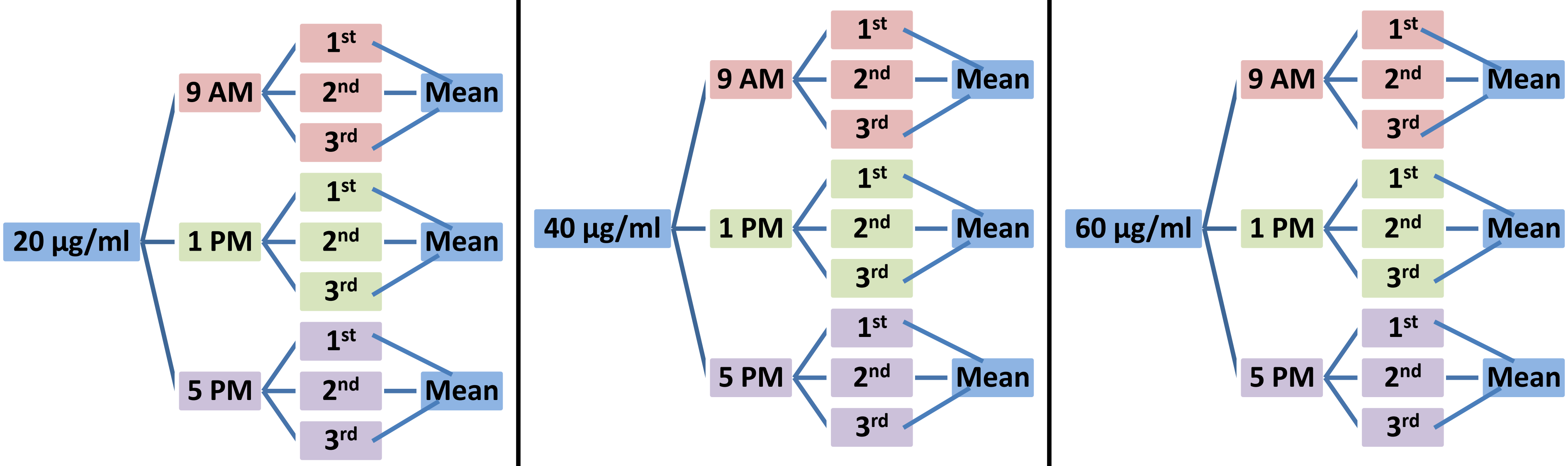
** Three differenent times (e.g: 9 AM, 1 PM & 5 PM) in the same day for **Repeatability***

** At one time (e.g: 9 AM) each day for 3 sucessive days (Day1, Day2 & Day3) for **Intermediate precision**.*

** In three different labs for **Reproduciblity**.*

Flow Chart for Precision (Repeatability)

“With in the same day at different times”



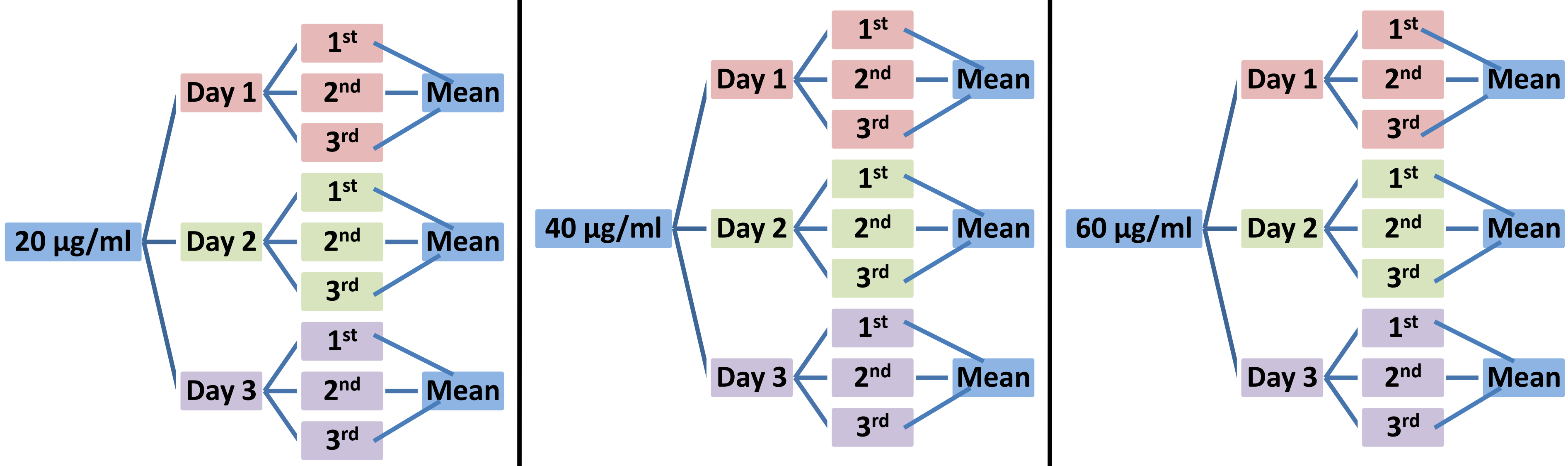
- 20 µg/ml
  - 9 AM
    - 1st
    - 2nd
    - 3rd
    - Mean
  - 1 PM
    - 1st
    - 2nd
    - 3rd
    - Mean
  - 5 PM
    - 1st
    - 2nd
    - 3rd
    - Mean

- 40 µg/ml
  - 9 AM
    - 1st
    - 2nd
    - 3rd
    - Mean
  - 1 PM
    - 1st
    - 2nd
    - 3rd
    - Mean
  - 5 PM
    - 1st
    - 2nd
    - 3rd
    - Mean

- 60 µg/ml
  - 9 AM
    - 1st
    - 2nd
    - 3rd
    - Mean
  - 1 PM
    - 1st
    - 2nd
    - 3rd
    - Mean
  - 5 PM
    - 1st
    - 2nd
    - 3rd
    - Mean

Flow Chart for Precision (Intermediate Precision)

“Between days at the same time (e.g.: 9 AM)”



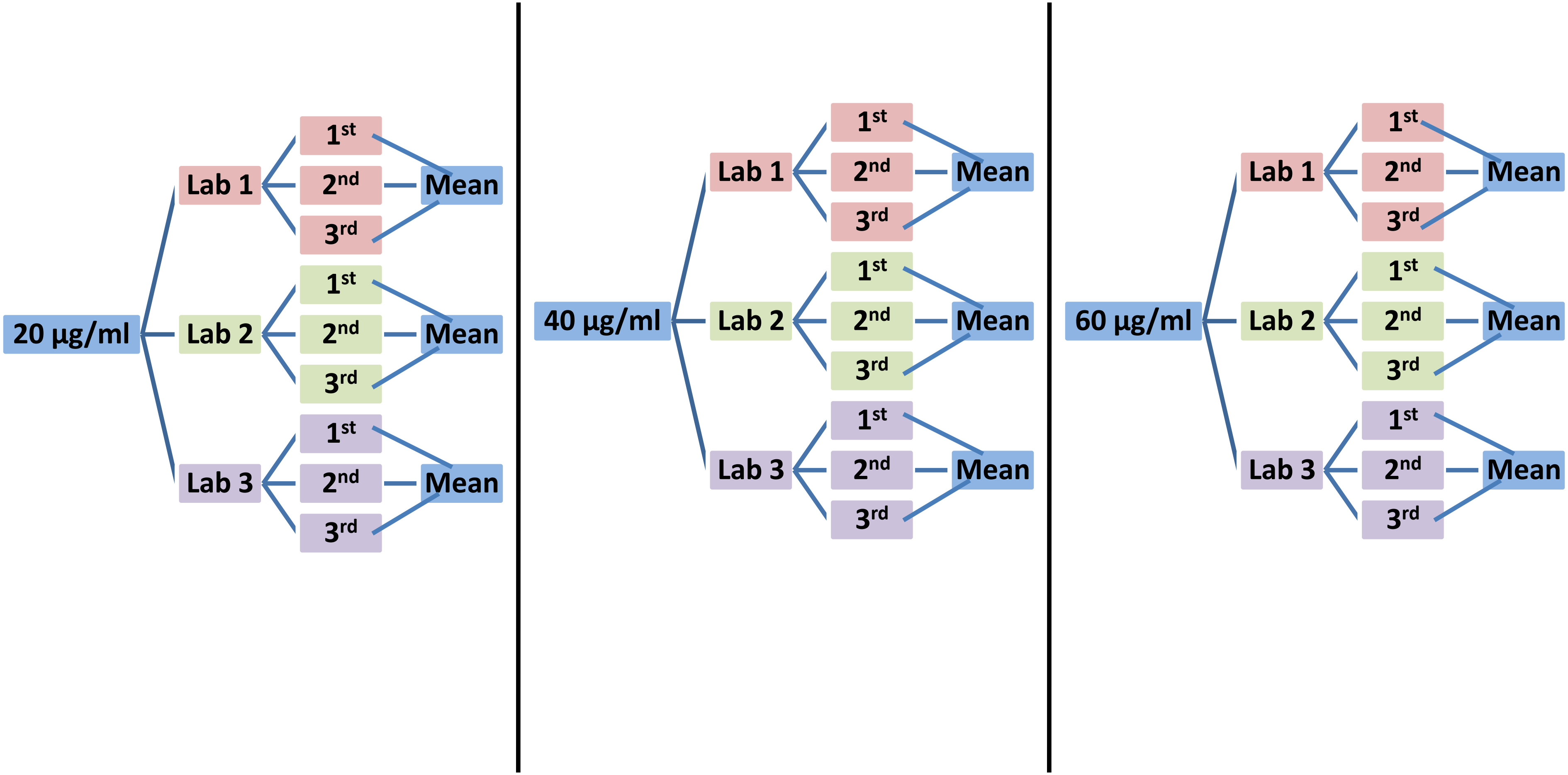
- 20 µg/ml
  - Day 1
    - 1st
    - 2nd
    - 3rd
    - Mean
  - Day 2
    - 1st
    - 2nd
    - 3rd
    - Mean
  - Day 3
    - 1st
    - 2nd
    - 3rd
    - Mean

- 40 µg/ml
  - Day 1
    - 1st
    - 2nd
    - 3rd
    - Mean
  - Day 2
    - 1st
    - 2nd
    - 3rd
    - Mean
  - Day 3
    - 1st
    - 2nd
    - 3rd
    - Mean

- 60 µg/ml
  - Day 1
    - 1st
    - 2nd
    - 3rd
    - Mean
  - Day 2
    - 1st
    - 2nd
    - 3rd
    - Mean
  - Day 3
    - 1st
    - 2nd
    - 3rd
    - Mean

Flow Chart for Precision (Reproduciblity)

“In different laboratories”



- 20 µg/ml
  - Lab 1
    - 1st
    - 2nd
    - 3rd
    - Mean
  - Lab 2
    - 1st
    - 2nd
    - 3rd
    - Mean
  - Lab 3
    - 1st
    - 2nd
    - 3rd
    - Mean

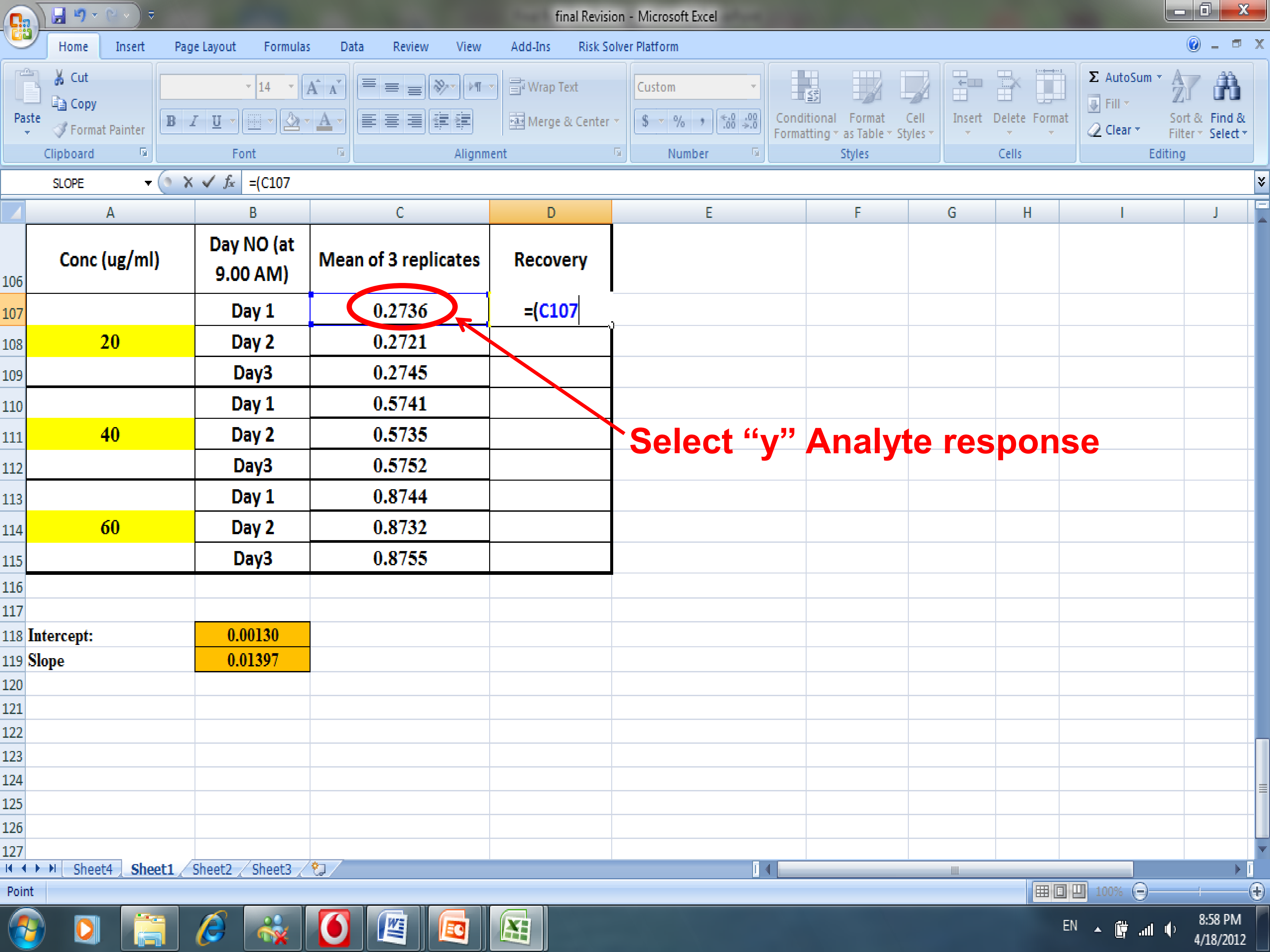
- 40 µg/ml
  - Lab 1
    - 1st
    - 2nd
    - 3rd
    - Mean
  - Lab 2
    - 1st
    - 2nd
    - 3rd
    - Mean
  - Lab 3
    - 1st
    - 2nd
    - 3rd
    - Mean

- 60 µg/ml
  - Lab 1
    - 1st
    - 2nd
    - 3rd
    - Mean
  - Lab 2
    - 1st
    - 2nd
    - 3rd
    - Mean
  - Lab 3
    - 1st
    - 2nd
    - 3rd
    - Mean

How to calculate precision?

- If the specified range is 10 – 70 µg/ml, then we can choose 3 concentration levels; close to the quantitation limit (20 µg/ml) , one in the middle of the range (40 µg/ml) and one at the high end of the calibration curve (60 µg/ml). Then;

2 –Recovery of each concentration is calculated using equation of “Linear Regression“.

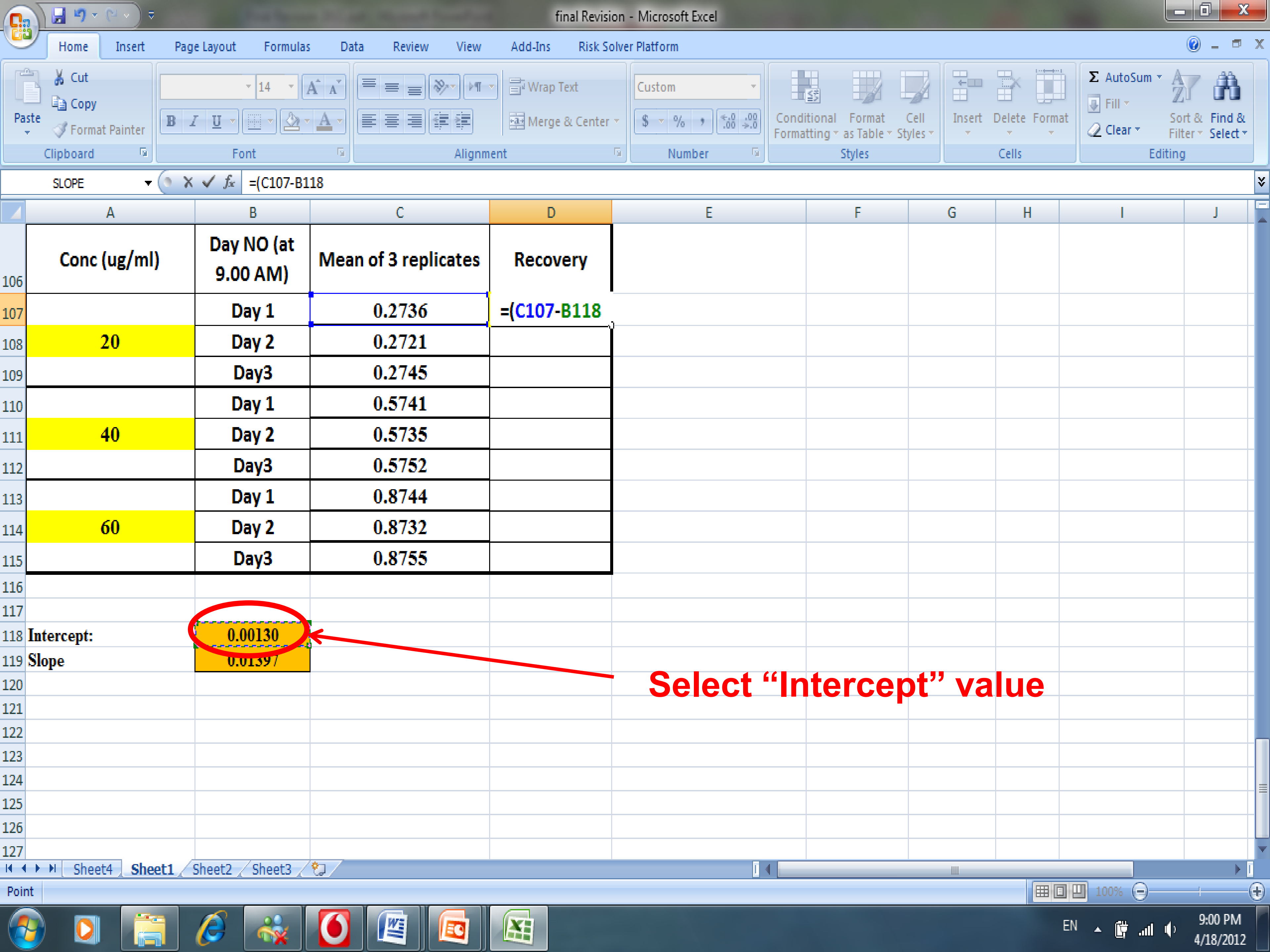


=(C107

Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery
	Day 1	0.2736	=(C107
20	Day 2	0.2721	
	Day3	0.2745	
	Day 1	0.5741	
40	Day 2	0.5735	
	Day3	0.5752	
	Day 1	0.8744	
60	Day 2	0.8732	
	Day3	0.8755	

Intercept:	0.00130
Slope	0.01397

Select “y” Analyte response

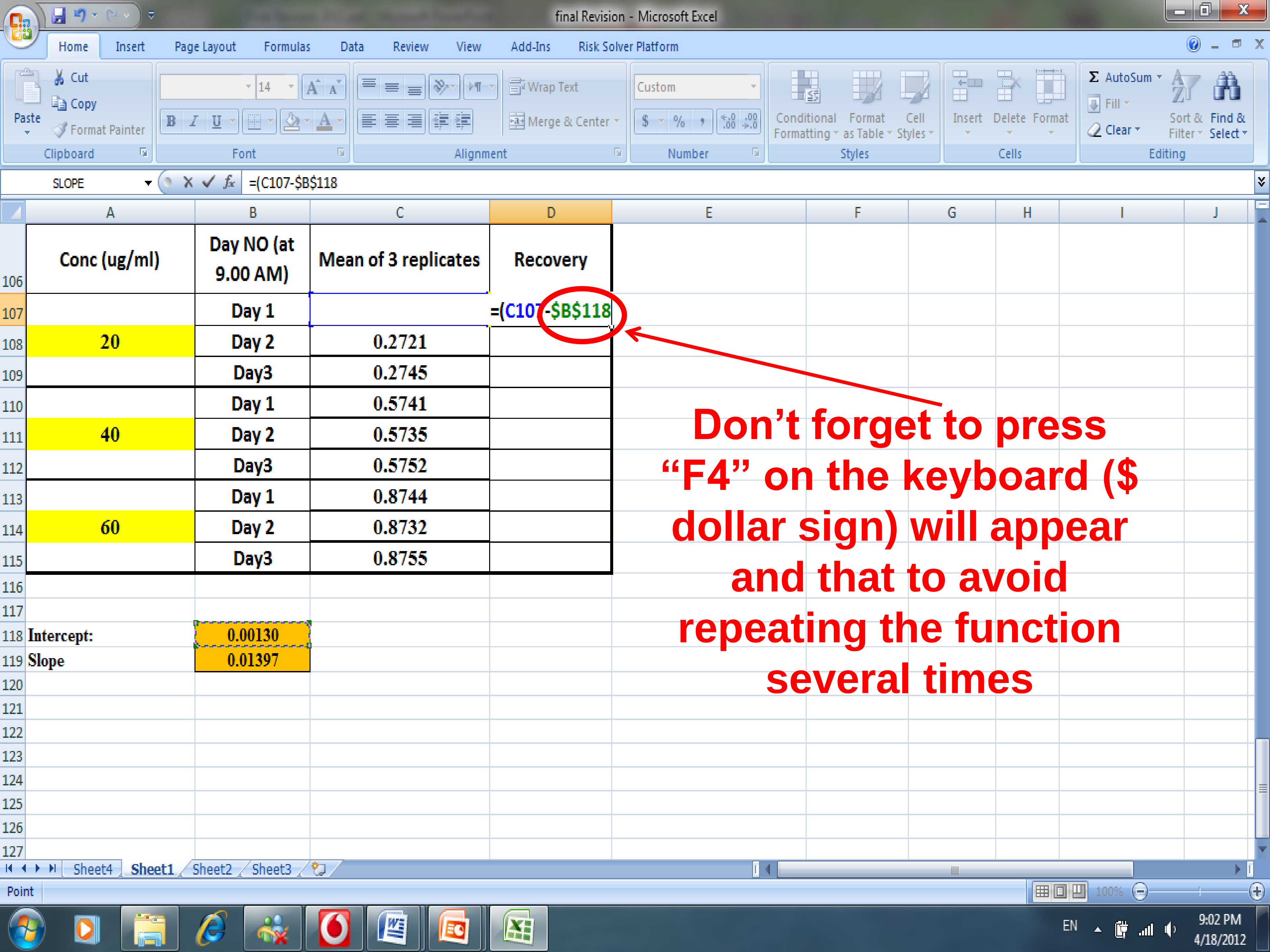


SLOPE =(C107-B118

Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery
	Day 1	0.2736	=(C107-B118
20	Day 2	0.2721	
	Day3	0.2745	
	Day 1	0.5741	
40	Day 2	0.5735	
	Day3	0.5752	
	Day 1	0.8744	
60	Day 2	0.8732	
	Day3	0.8755	

Intercept:	0.00130
Slope	0.01397

Select “Intercept” value

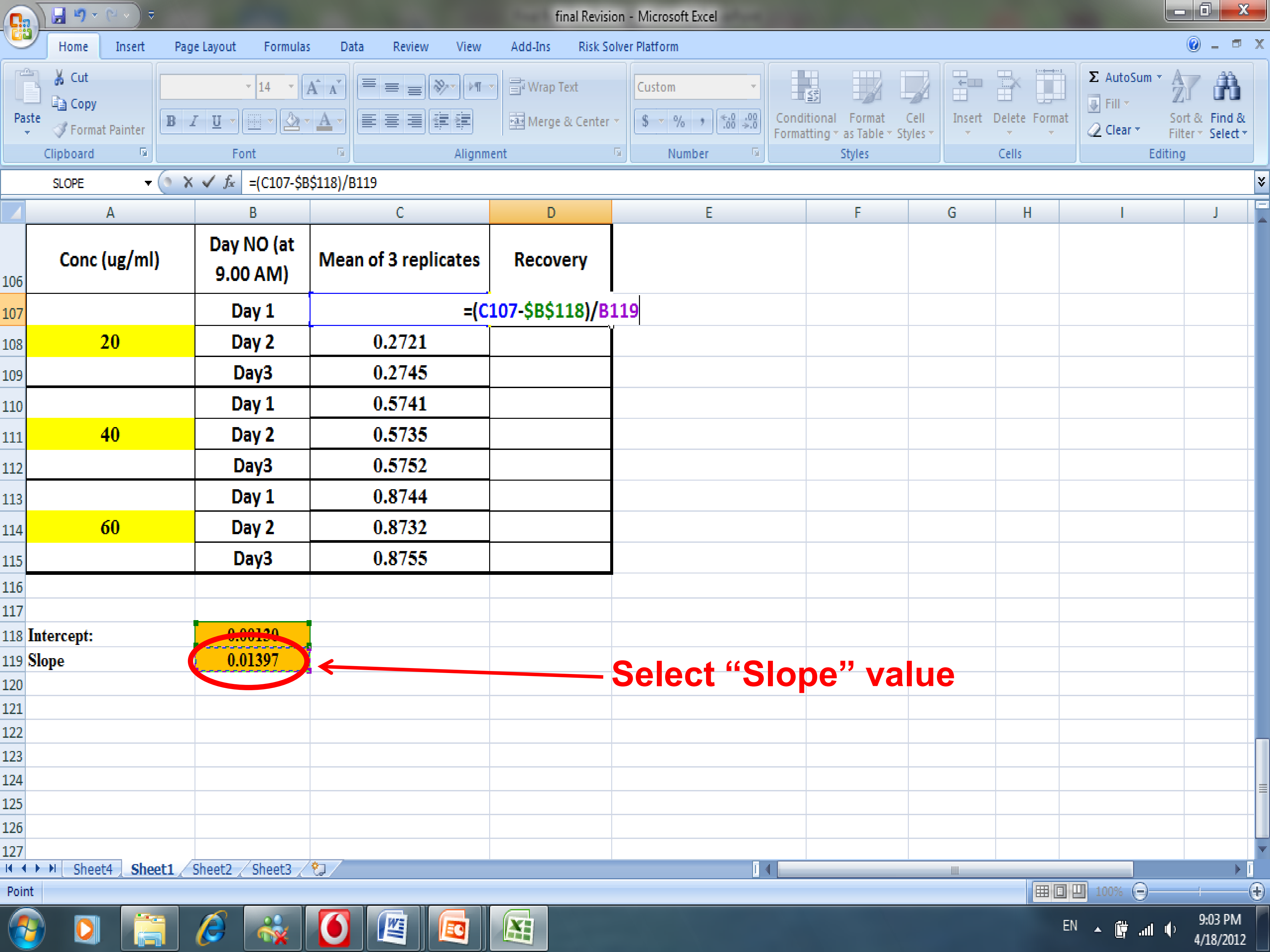


=(C107-$B$118

Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery
	Day 1		=(C107-$B$118
20	Day 2	0.2721	
	Day3	0.2745	
	Day 1	0.5741	
40	Day 2	0.5735	
	Day3	0.5752	
	Day 1	0.8744	
60	Day 2	0.8732	
	Day3	0.8755	

Intercept: 0.00130
Slope 0.01397

Don't forget to press "F4" on the keyboard ($ dollar sign) will appear and that to avoid repeating the function several times

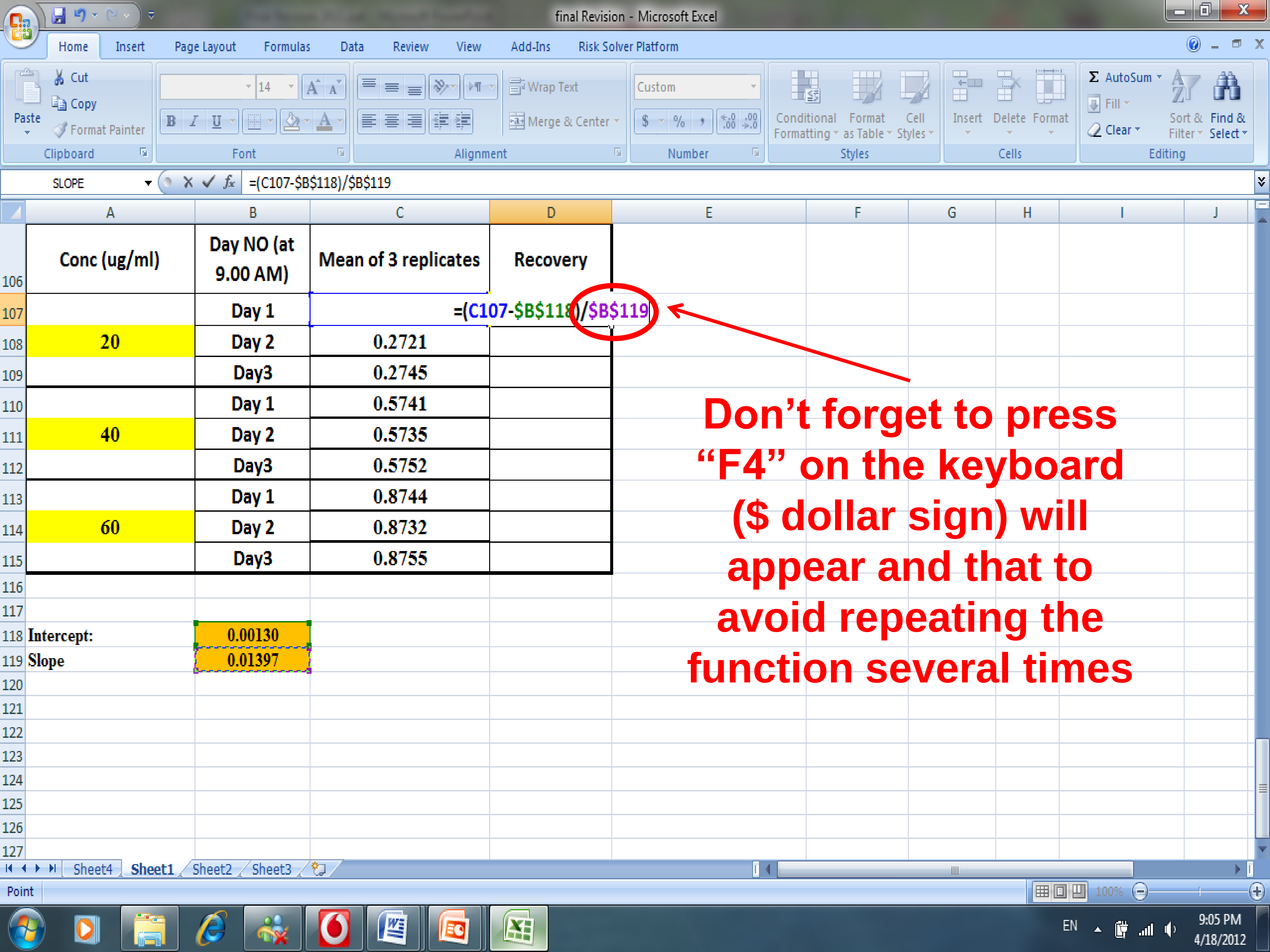


SLOPE

`=(C107-$B$118)/B119`

	A	B	C	D
106	Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery
107		Day 1	=(C107-$B$118)/B119	
108	20	Day 2	0.2721	
109		Day3	0.2745	
110		Day 1	0.5741	
111	40	Day 2	0.5735	
112		Day3	0.5752	
113		Day 1	0.8744	
114	60	Day 2	0.8732	
115		Day3	0.8755	
116				
117				
118	Intercept:	0.00130		
119	Slope	0.01397		

Select “Slope” value

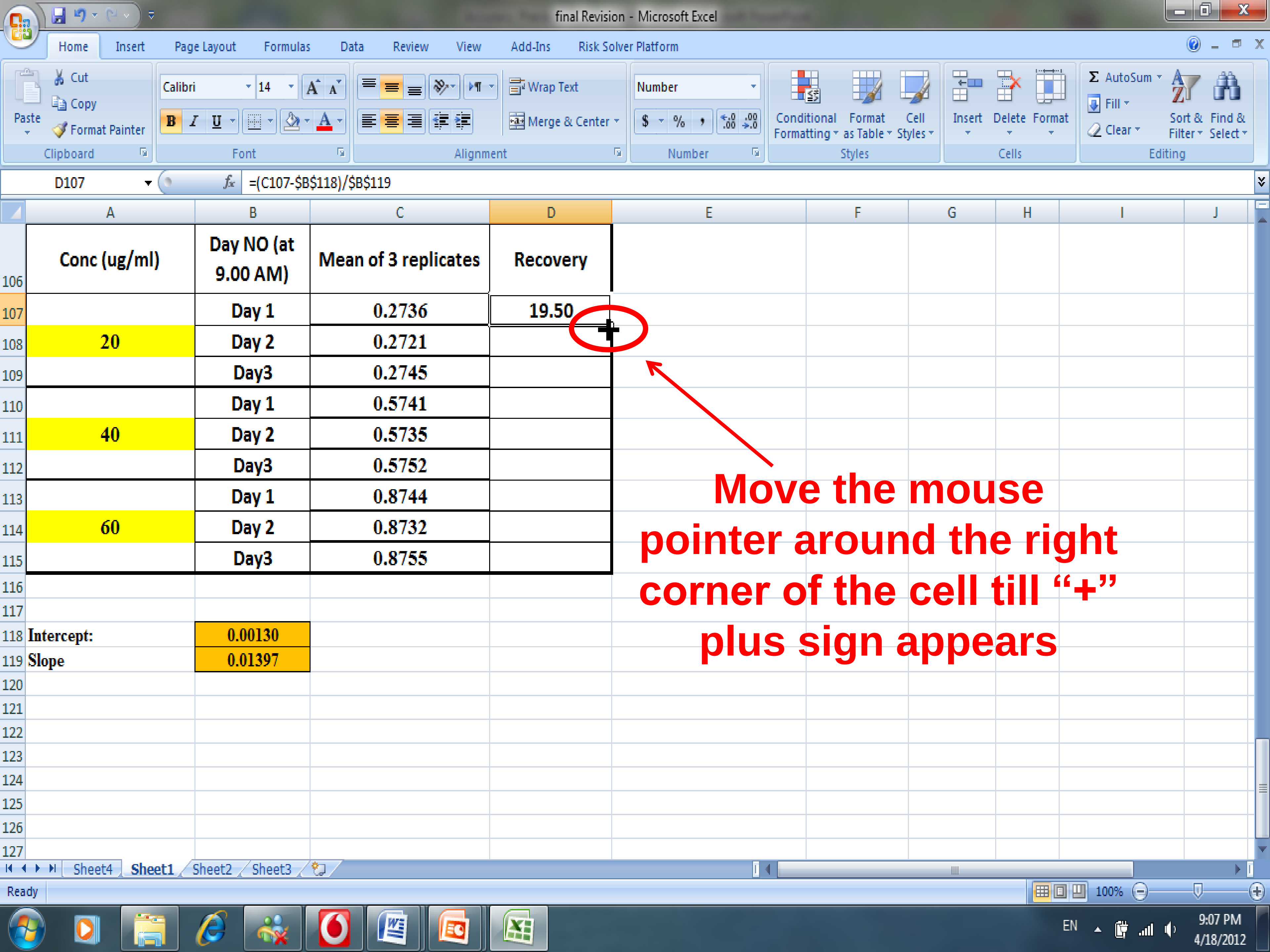


SLOPE =(C107-$B$118)/$B$119

Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery
	Day 1	=(C107-$B$118)/$B$119	
20	Day 2	0.2721	
	Day3	0.2745	
	Day 1	0.5741	
40	Day 2	0.5735	
	Day3	0.5752	
	Day 1	0.8744	
60	Day 2	0.8732	
	Day3	0.8755	

Intercept:	0.00130
Slope	0.01397

Don’t forget to press “F4” on the keyboard ($ dollar sign) will appear and that to avoid repeating the function several times



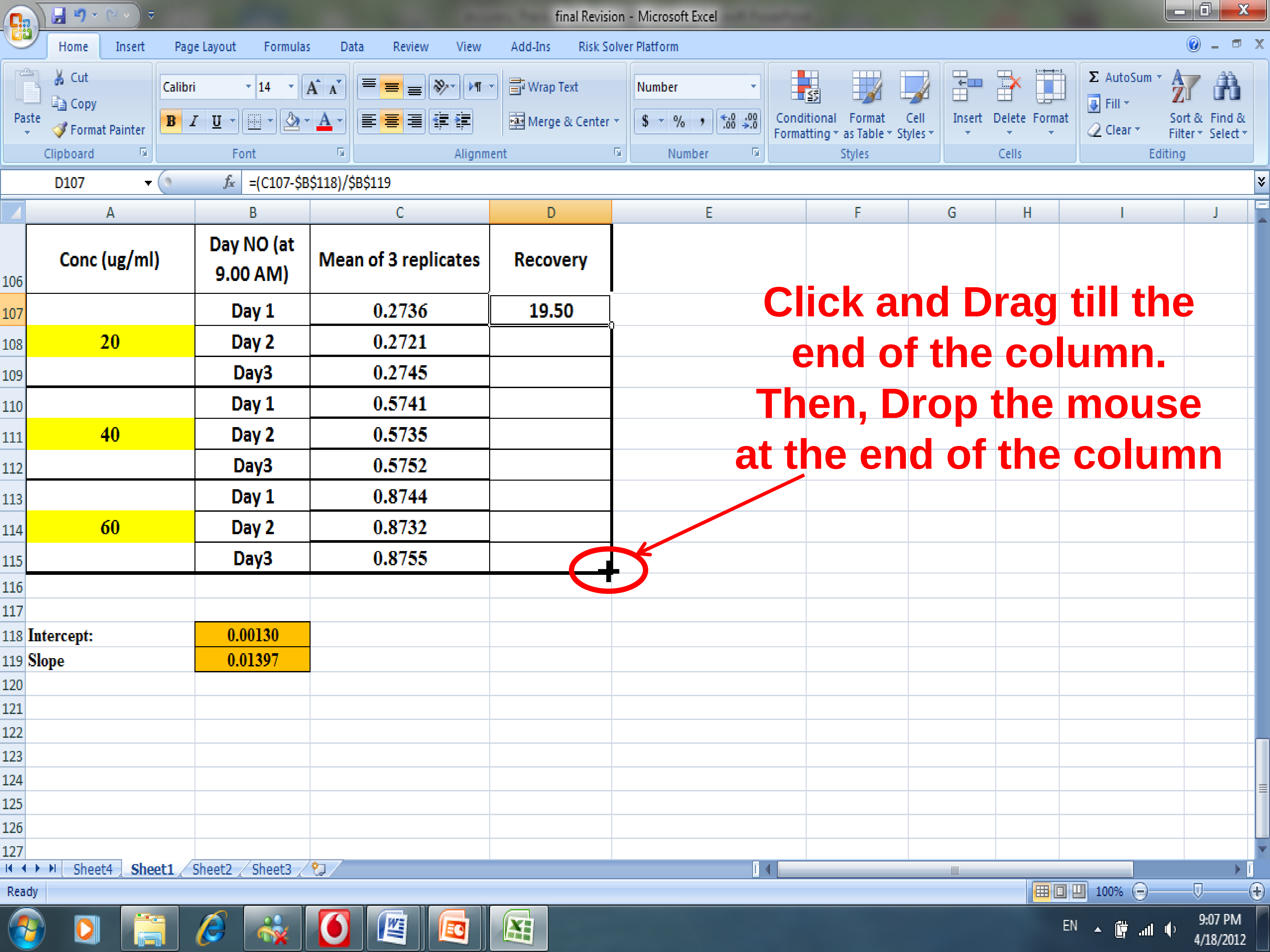
D107

=(C107-$B$118)/$B$119

Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery
	Day 1	0.2736	19.50
20	Day 2	0.2721	
	Day3	0.2745	
	Day 1	0.5741	
40	Day 2	0.5735	
	Day3	0.5752	
	Day 1	0.8744	
60	Day 2	0.8732	
	Day3	0.8755	

Intercept:	0.00130
Slope	0.01397

Move the mouse pointer around the right corner of the cell till “+” plus sign appears

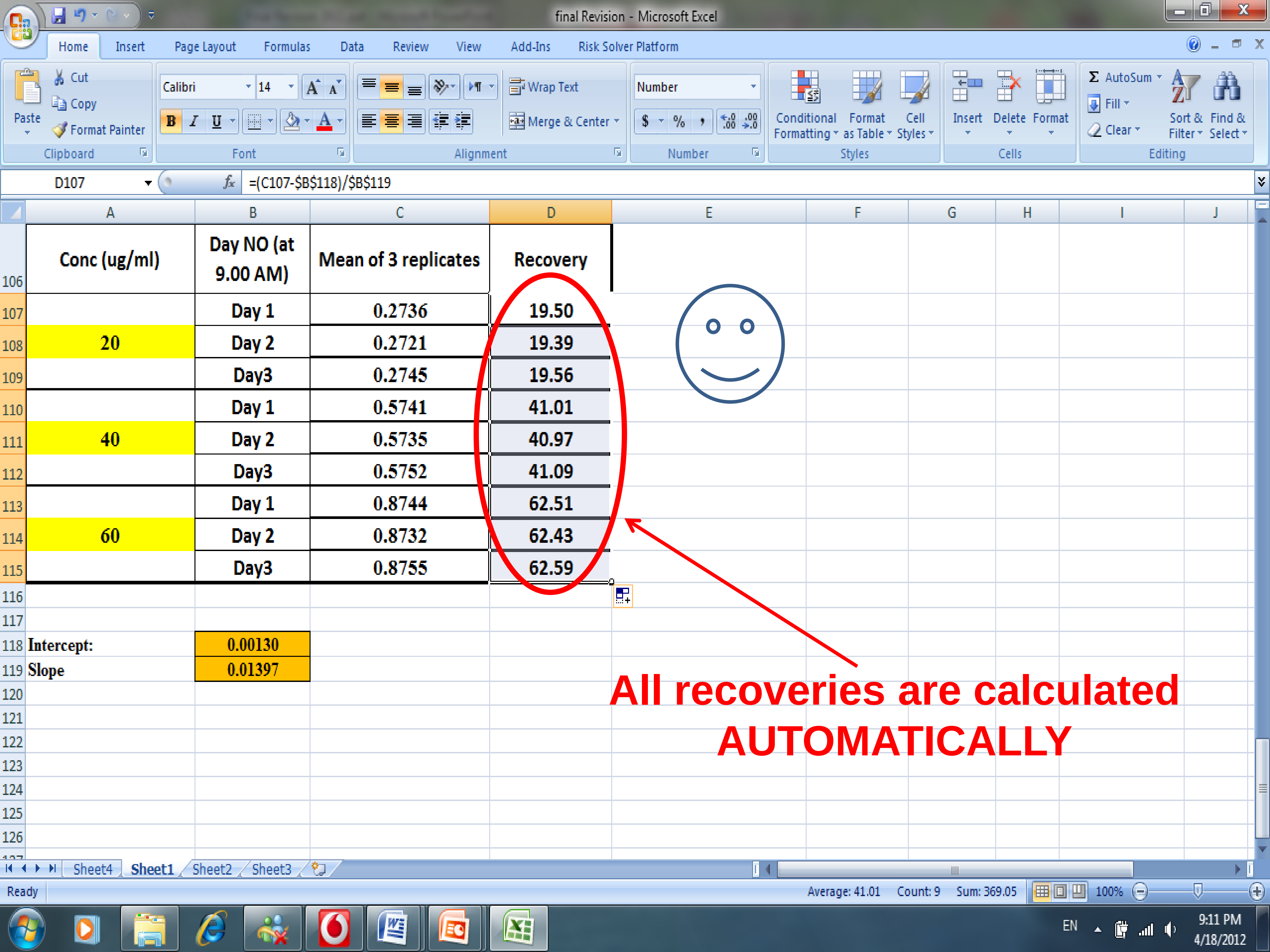


D107 =(C107-$B$118)/$B$119

Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery
	Day 1	0.2736	19.50
20	Day 2	0.2721	
	Day3	0.2745	
	Day 1	0.5741	
40	Day 2	0.5735	
	Day3	0.5752	
	Day 1	0.8744	
60	Day 2	0.8732	
	Day3	0.8755	

Intercept:	0.00130
Slope	0.01397

Click and Drag till the end of the column. Then, Drop the mouse at the end of the column



D107 =(C107-$B$118)/$B$119

Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery
	Day 1	0.2736	19.50
20	Day 2	0.2721	19.39
	Day3	0.2745	19.56
	Day 1	0.5741	41.01
40	Day 2	0.5735	40.97
	Day3	0.5752	41.09
	Day 1	0.8744	62.51
60	Day 2	0.8732	62.43
	Day3	0.8755	62.59

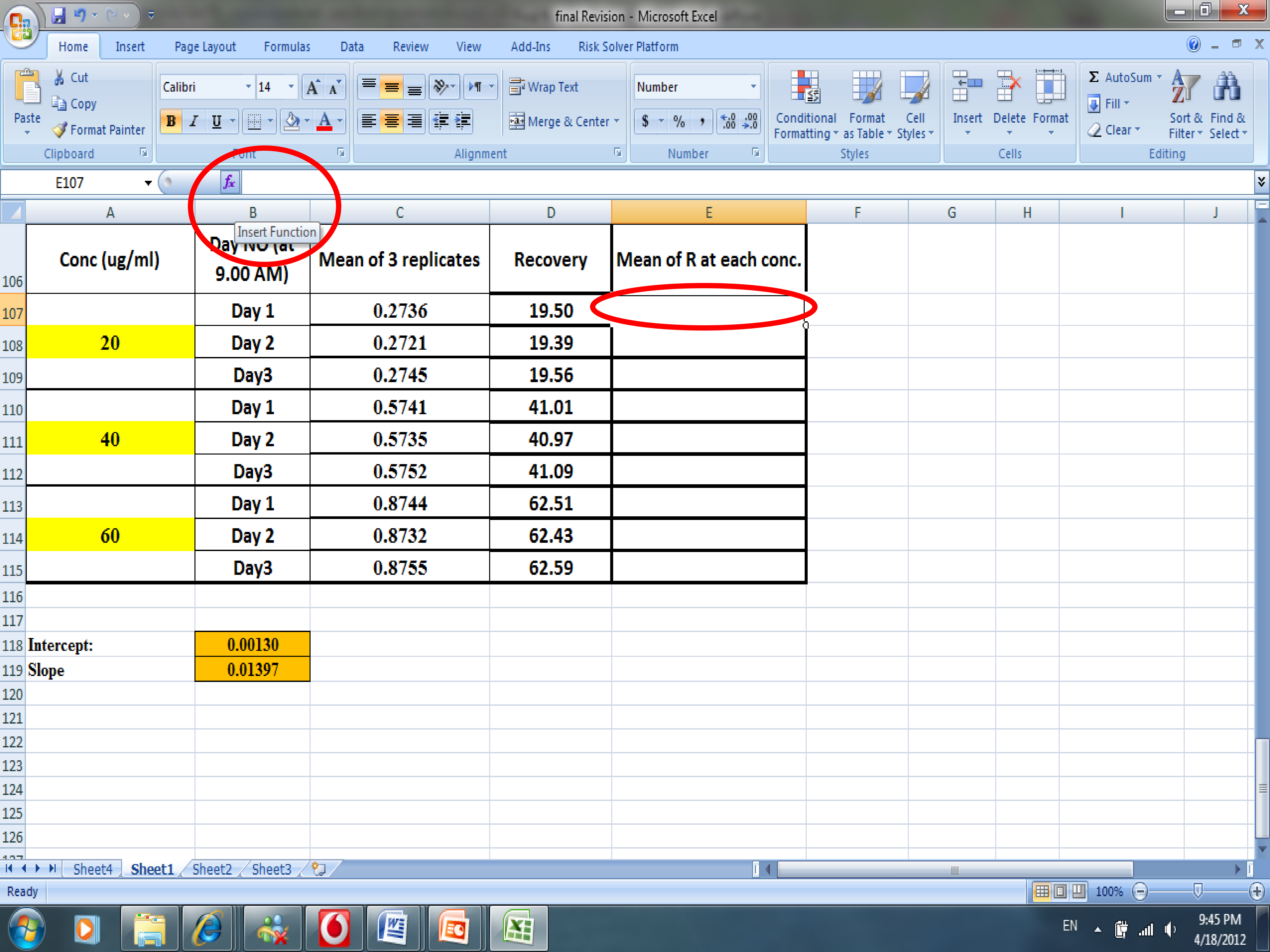
Intercept:	0.00130
Slope	0.01397

All recoveries are calculated AUTOMATICALLY

How to calculate precision?

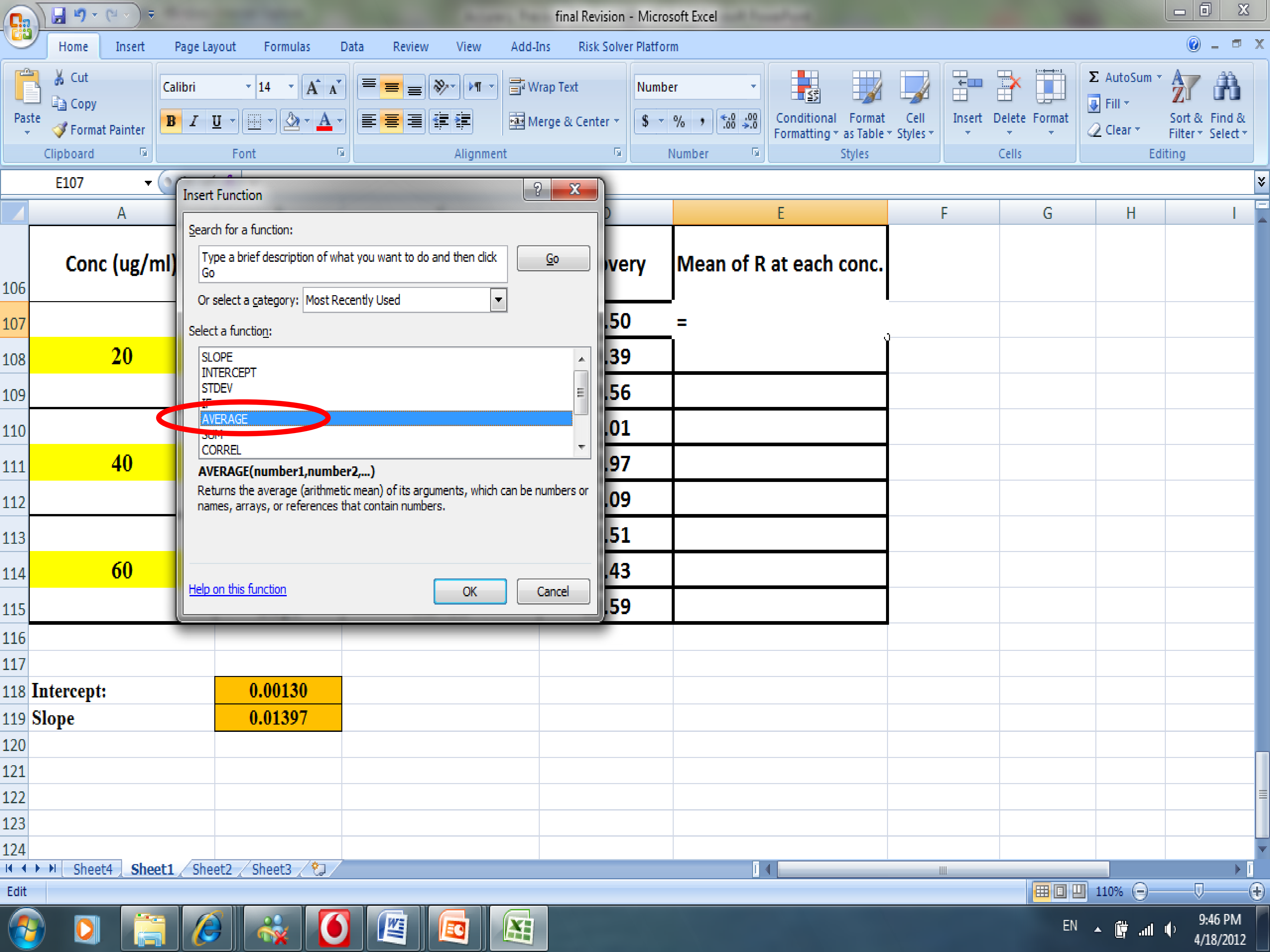
- If the specified range is 10 – 70 µg/ml, then we can choose 3 concentration levels; close to the quantitation limit (20 µg/ml) , one in the middle of the range (40 µg/ml) and one at the high end of the calibration curve (60 µg/ml). Then;

3 – Mean of Recovery at each concentration is calculated.



Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery	Mean of R at each conc.
	Day 1	0.2736	19.50	
20	Day 2	0.2721	19.39	
	Day3	0.2745	19.56	
	Day 1	0.5741	41.01	
40	Day 2	0.5735	40.97	
	Day3	0.5752	41.09	
	Day 1	0.8744	62.51	
60	Day 2	0.8732	62.43	
	Day3	0.8755	62.59	

Intercept:	0.00130
Slope	0.01397



E107

Insert Function

Search for a function:

Type a brief description of what you want to do and then click Go

Go

Or select a category: Most Recently Used

Select a function:

SLOPE
INTERCEPT
STDEV
IF
AVERAGE
SUM
CORREL

AVERAGE(number1,number2,...)

Returns the average (arithmetic mean) of its arguments, which can be numbers or names, arrays, or references that contain numbers.

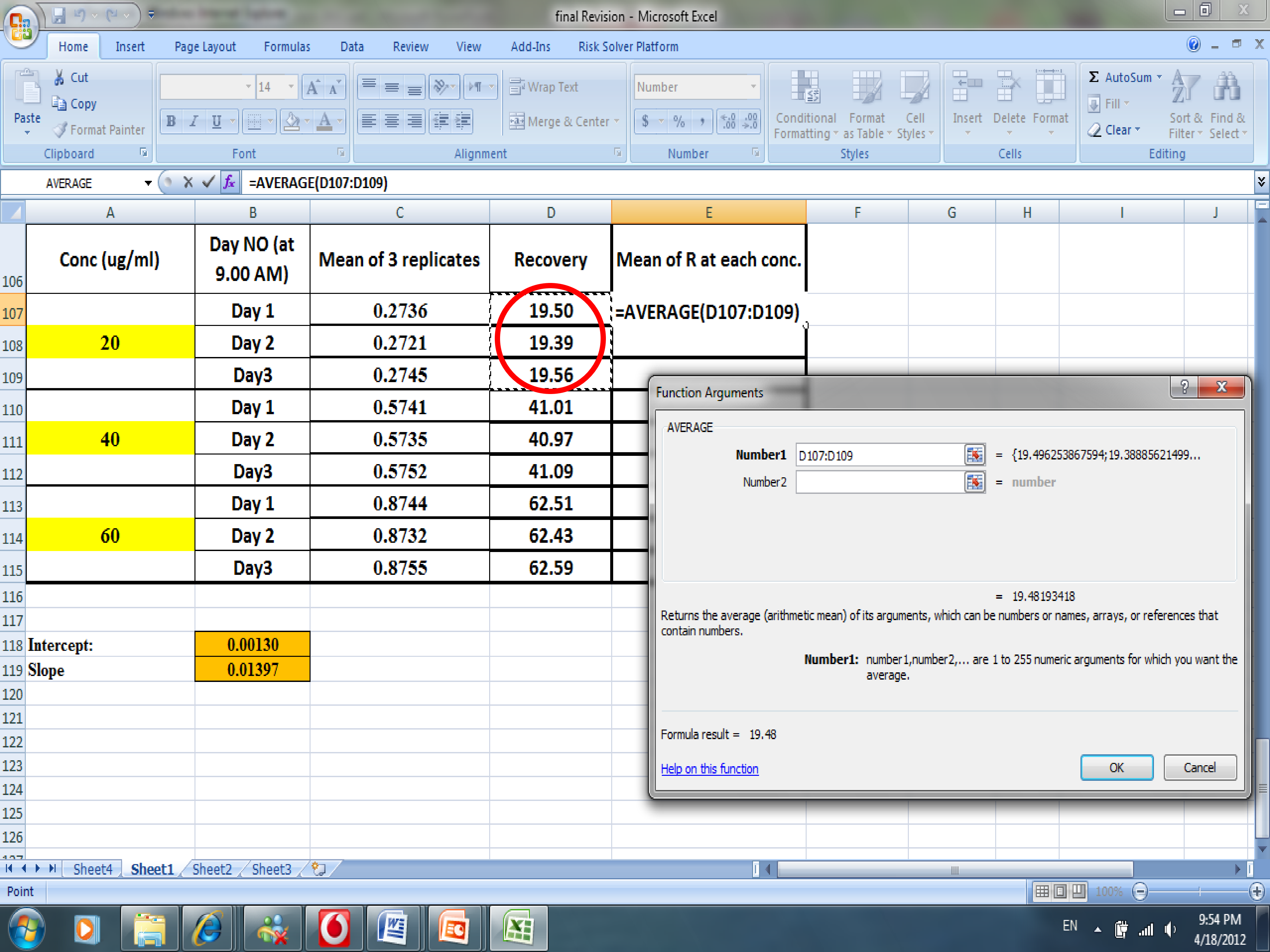
Help on this function

OK

Cancel

Row	A	D	E
106	Conc (ug/ml)	very	Mean of R at each conc.
107		.50	=
108	20	.39	
109		.56	
110		.01	
111	40	.97	
112		.09	
113		.51	
114	60	.43	
115		.59	

Row	A	B
118	Intercept:	0.00130
119	Slope	0.01397



=AVERAGE(D107:D109)

	A	B	C	D	E
106	Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery	Mean of R at each conc.
107		Day 1	0.2736	19.50	=AVERAGE(D107:D109)
108	20	Day 2	0.2721	19.39	
109		Day3	0.2745	19.56	
110		Day 1	0.5741	41.01	
111	40	Day 2	0.5735	40.97	
112		Day3	0.5752	41.09	
113		Day 1	0.8744	62.51	
114	60	Day 2	0.8732	62.43	
115		Day3	0.8755	62.59	
118	**Intercept:**	0.00130			
119	**Slope**	0.01397			

Function Arguments

AVERAGE

Number1 D107:D109 = {19.496253867594;19.38885621499...

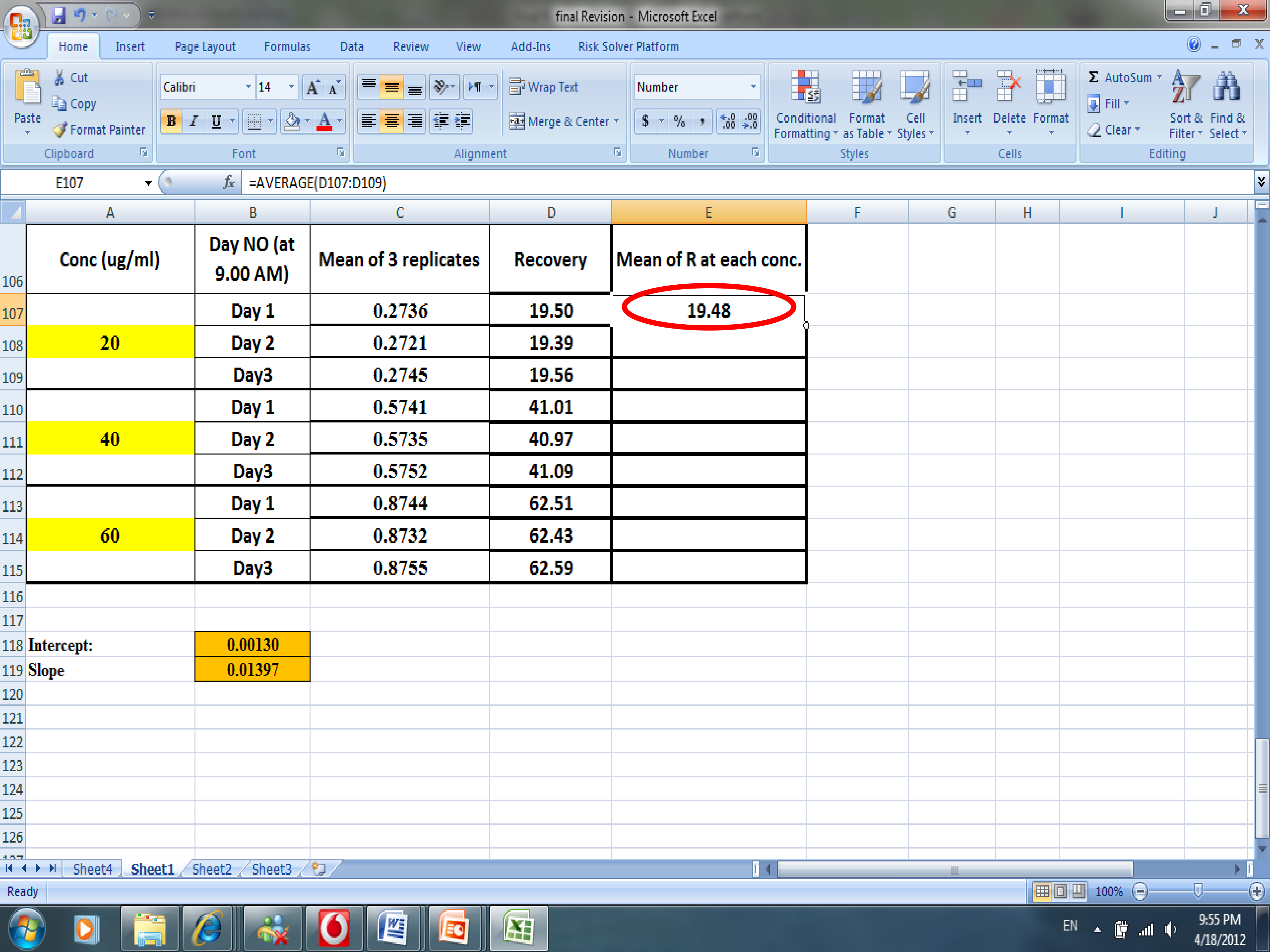
Number2 = number

= 19.48193418

Returns the average (arithmetic mean) of its arguments, which can be numbers or names, arrays, or references that contain numbers.

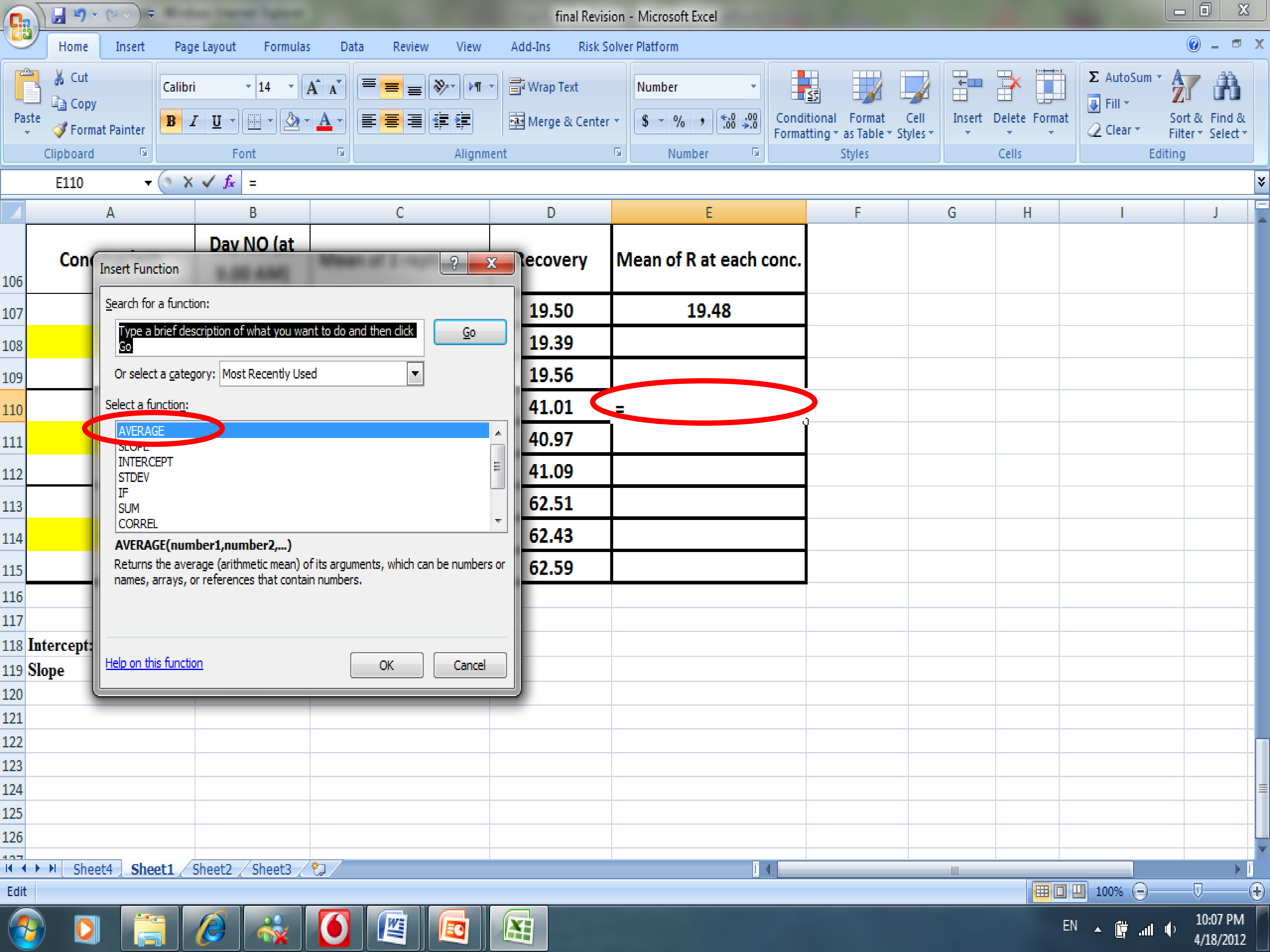
Number1: number1,number2,... are 1 to 255 numeric arguments for which you want the average.

Formula result = 19.48



E107 =AVERAGE(D107:D109)

	A	B	C	D	E
106	Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery	Mean of R at each conc.
107		Day 1	0.2736	19.50	19.48
108	20	Day 2	0.2721	19.39	
109		Day3	0.2745	19.56	
110		Day 1	0.5741	41.01	
111	40	Day 2	0.5735	40.97	
112		Day3	0.5752	41.09	
113		Day 1	0.8744	62.51	
114	60	Day 2	0.8732	62.43	
115		Day3	0.8755	62.59	
116					
117					
118	Intercept:	0.00130			
119	Slope	0.01397			



E110 =

Row	A	B	D	E
106	Con	Day NO (at	ecovery	Mean of R at each conc.
107			19.50	19.48
108			19.39	
109			19.56	
110			41.01	=
111			40.97	
112			41.09	
113			62.51	
114			62.43	
115			62.59	

118 **Intercept:**

119 **Slope**

Insert Function

Search for a function:

Type a brief description of what you want to do and then click Go

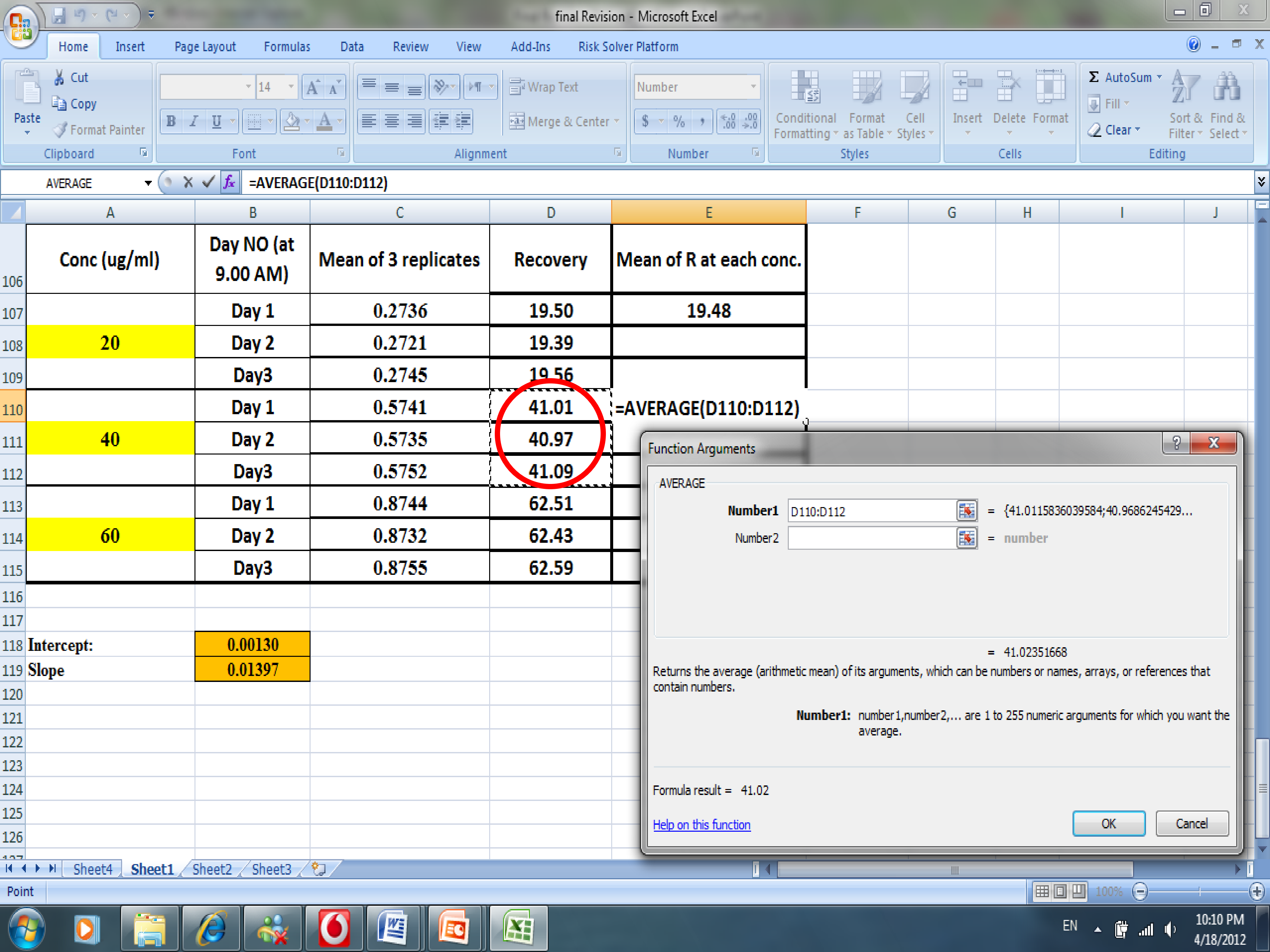
Or select a category: Most Recently Used

Select a function:

- AVERAGE
- SLOPE
- INTERCEPT
- STDEV
- IF
- SUM
- CORREL

AVERAGE(number1,number2,...)

Returns the average (arithmetic mean) of its arguments, which can be numbers or names, arrays, or references that contain numbers.



AVERAGE =AVERAGE(D110:D112)

	A	B	C	D	E
106	Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery	Mean of R at each conc.
107		Day 1	0.2736	19.50	19.48
108	20	Day 2	0.2721	19.39	
109		Day3	0.2745	19.56	
110		Day 1	0.5741	41.01	=AVERAGE(D110:D112)
111	40	Day 2	0.5735	40.97	
112		Day3	0.5752	41.09	
113		Day 1	0.8744	62.51	
114	60	Day 2	0.8732	62.43	
115		Day3	0.8755	62.59	
118	Intercept:	0.00130			
119	Slope	0.01397			

Function Arguments

AVERAGE

Number1 D110:D112 = {41.0115836039584;40.9686245429...

Number2 = number

= 41.02351668

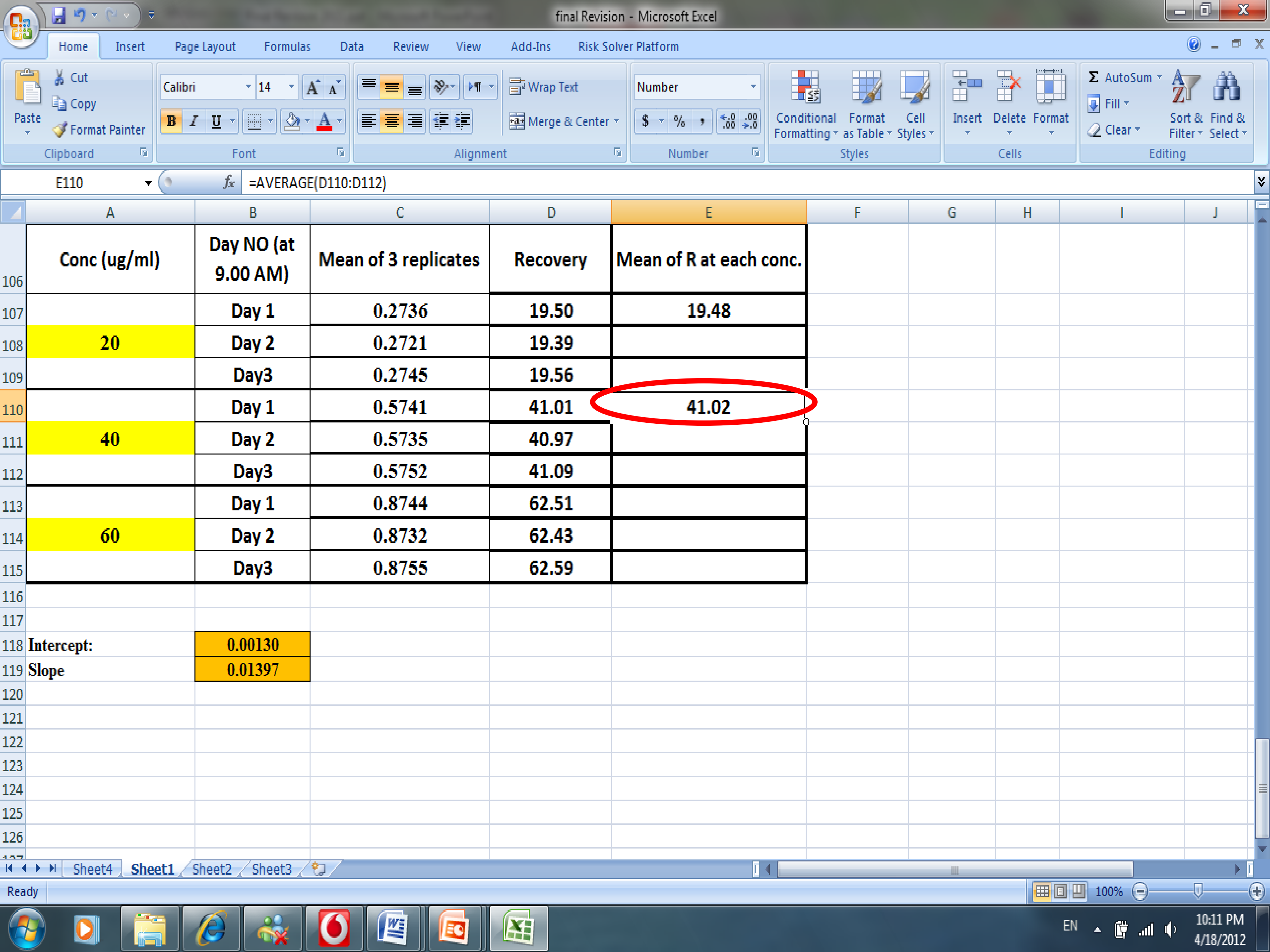
Returns the average (arithmetic mean) of its arguments, which can be numbers or names, arrays, or references that contain numbers.

Number1: number1,number2,... are 1 to 255 numeric arguments for which you want the average.

Formula result = 41.02

Help on this function

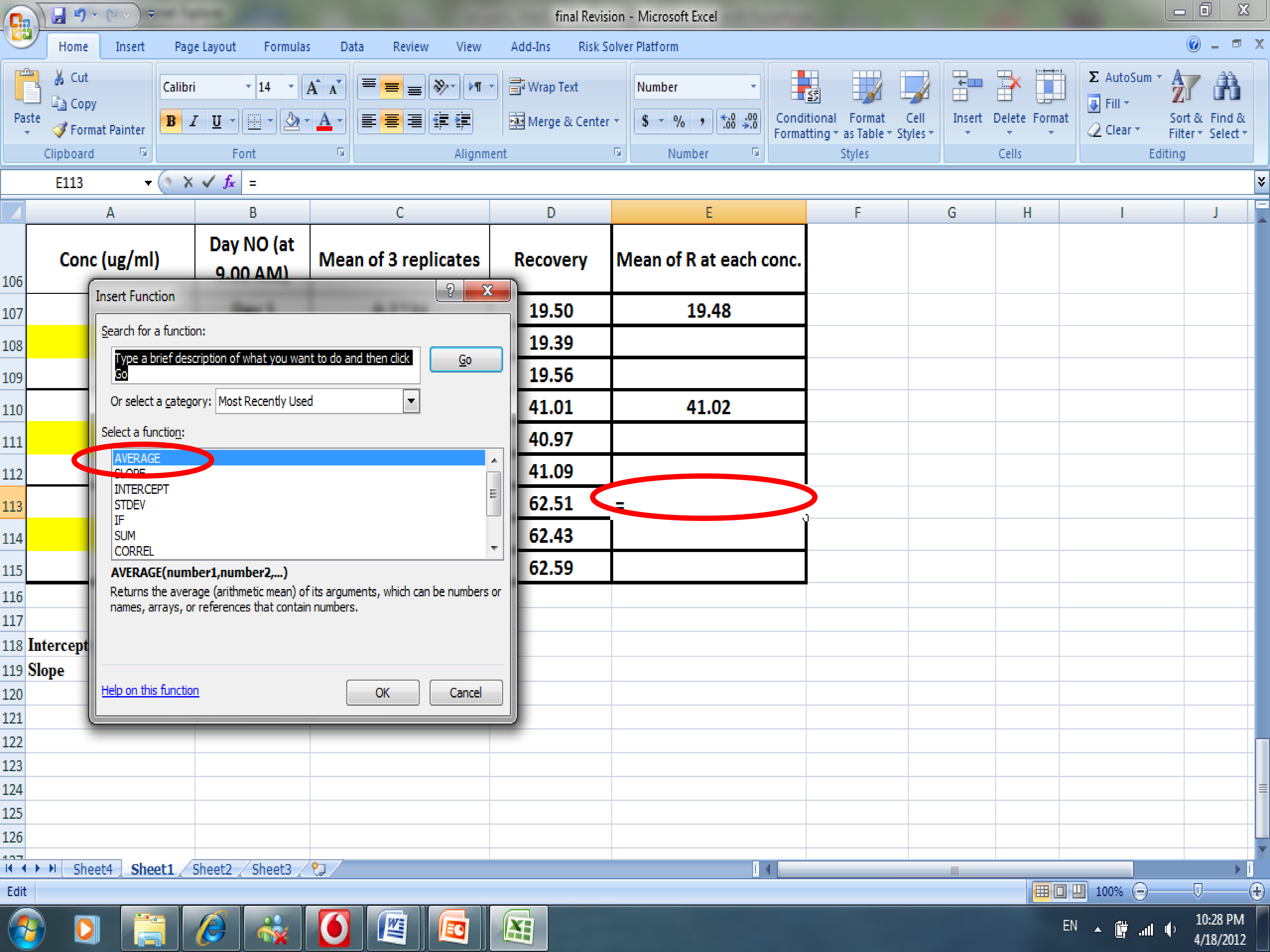
OK Cancel



E110 =AVERAGE(D110:D112)

Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery	Mean of R at each conc.
	Day 1	0.2736	19.50	19.48
20	Day 2	0.2721	19.39	
	Day3	0.2745	19.56	
	Day 1	0.5741	41.01	41.02
40	Day 2	0.5735	40.97	
	Day3	0.5752	41.09	
	Day 1	0.8744	62.51	
60	Day 2	0.8732	62.43	
	Day3	0.8755	62.59	

Intercept:	0.00130
Slope	0.01397



E113 =

Row	Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery	Mean of R at each conc.
107				19.50	19.48
108				19.39	
109				19.56	
110				41.01	41.02
111				40.97	
112				41.09	
113				62.51	=
114				62.43	
115				62.59	

118 Intercept

119 Slope

Insert Function

Search for a function:

Type a brief description of what you want to do and then click Go

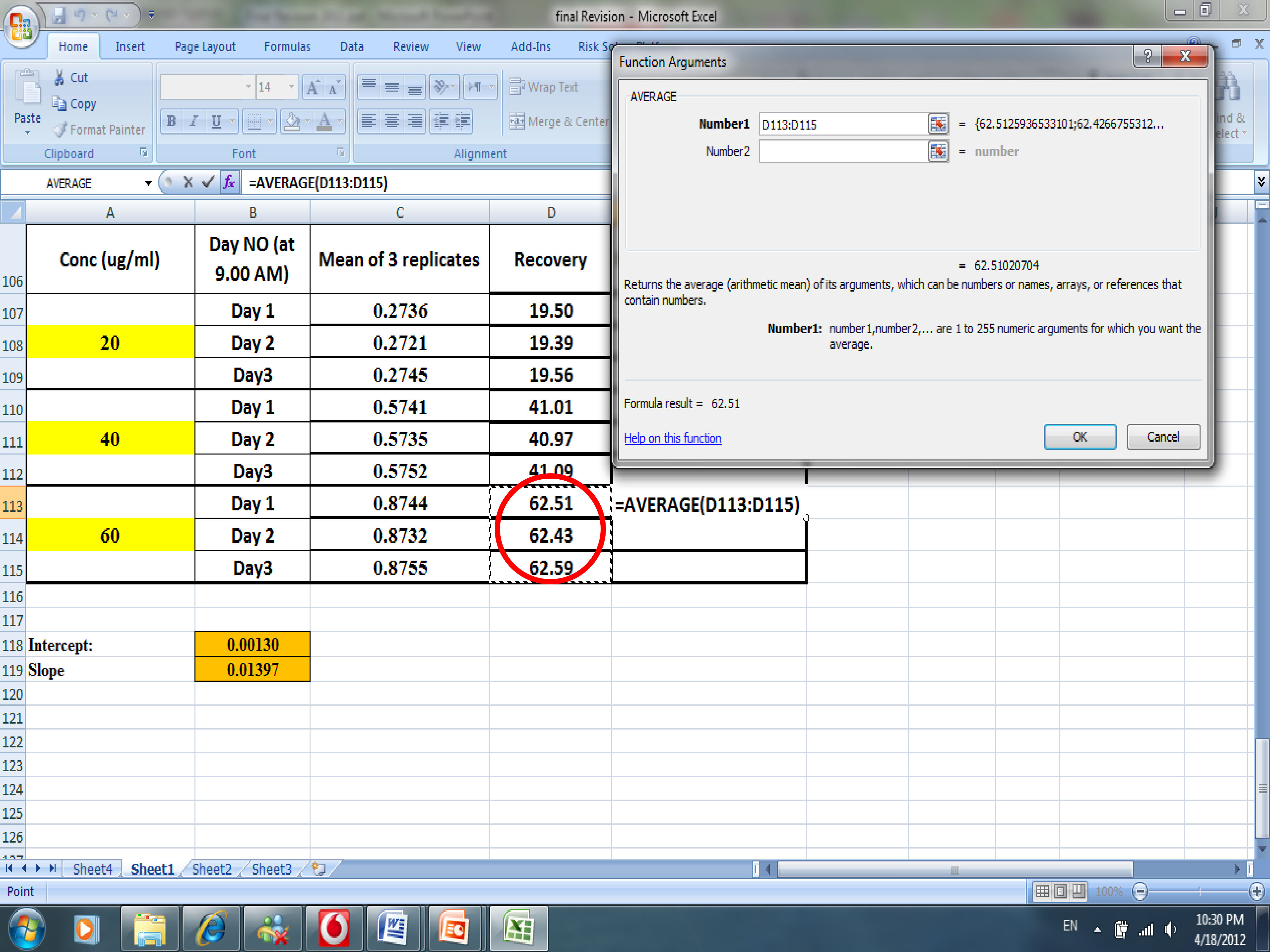
Or select a category: Most Recently Used

Select a function:

- AVERAGE
- SLOPE
- INTERCEPT
- STDEV
- IF
- SUM
- CORREL

AVERAGE(number1,number2,...)

Returns the average (arithmetic mean) of its arguments, which can be numbers or names, arrays, or references that contain numbers.



=AVERAGE(D113:D115)

	Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery	
107		Day 1	0.2736	19.50	
108	20	Day 2	0.2721	19.39	
109		Day3	0.2745	19.56	
110		Day 1	0.5741	41.01	
111	40	Day 2	0.5735	40.97	
112		Day3	0.5752	41.09	
113		Day 1	0.8744	62.51	=AVERAGE(D113:D115)
114	60	Day 2	0.8732	62.43	
115		Day3	0.8755	62.59	

118	Intercept:	0.00130
119	Slope	0.01397

Function Arguments

AVERAGE

Number1 D113:D115 = {62.5125936533101;62.4266755312...

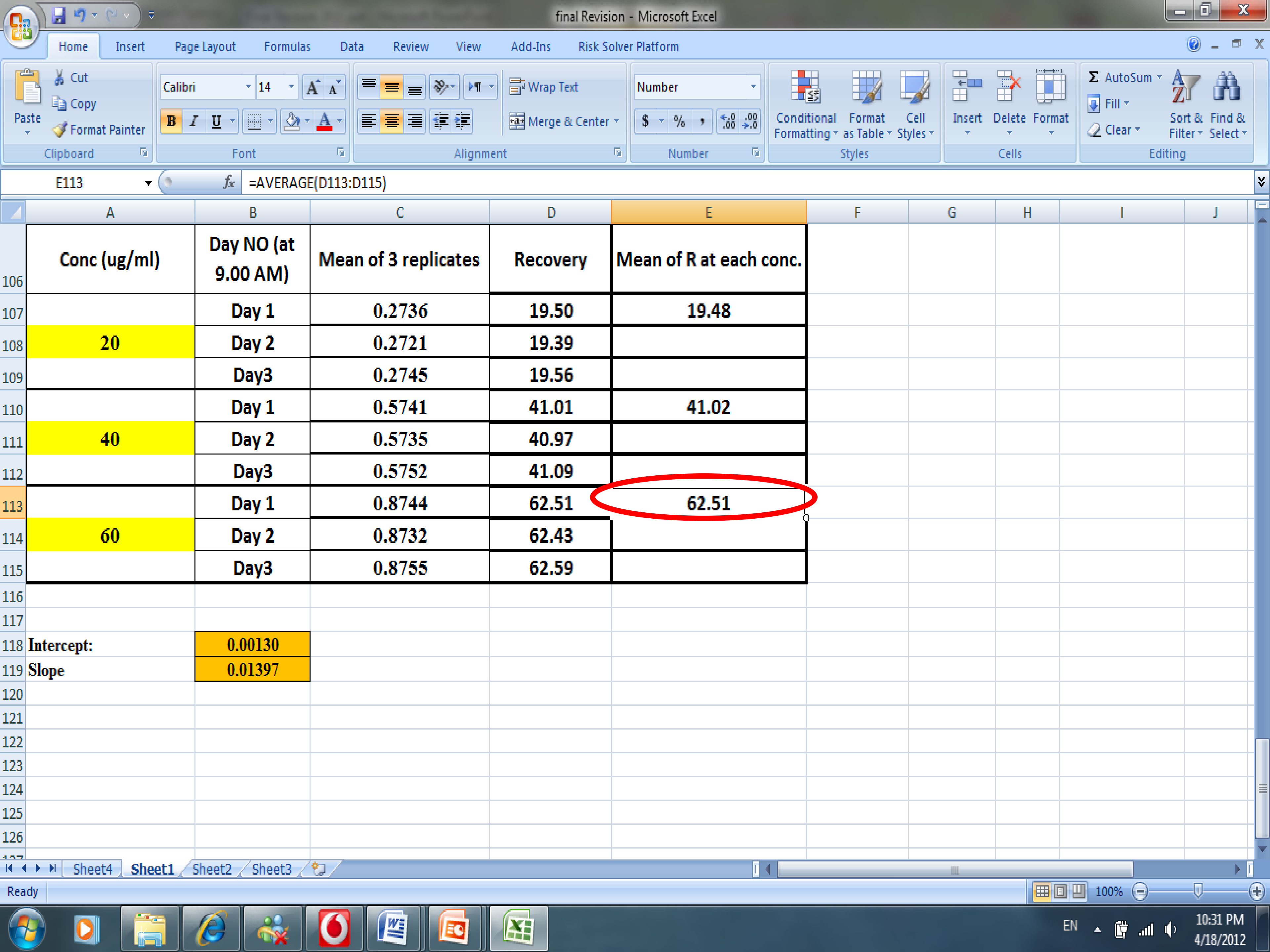
Number2 = number

= 62.51020704

Returns the average (arithmetic mean) of its arguments, which can be numbers or names, arrays, or references that contain numbers.

Number1: number1,number2,... are 1 to 255 numeric arguments for which you want the average.

Formula result = 62.51



E113

=AVERAGE(D113:D115)

Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery	Mean of R at each conc.
	Day 1	0.2736	19.50	19.48
20	Day 2	0.2721	19.39	
	Day3	0.2745	19.56	
	Day 1	0.5741	41.01	41.02
40	Day 2	0.5735	40.97	
	Day3	0.5752	41.09	
	Day 1	0.8744	62.51	62.51
60	Day 2	0.8732	62.43	
	Day3	0.8755	62.59	

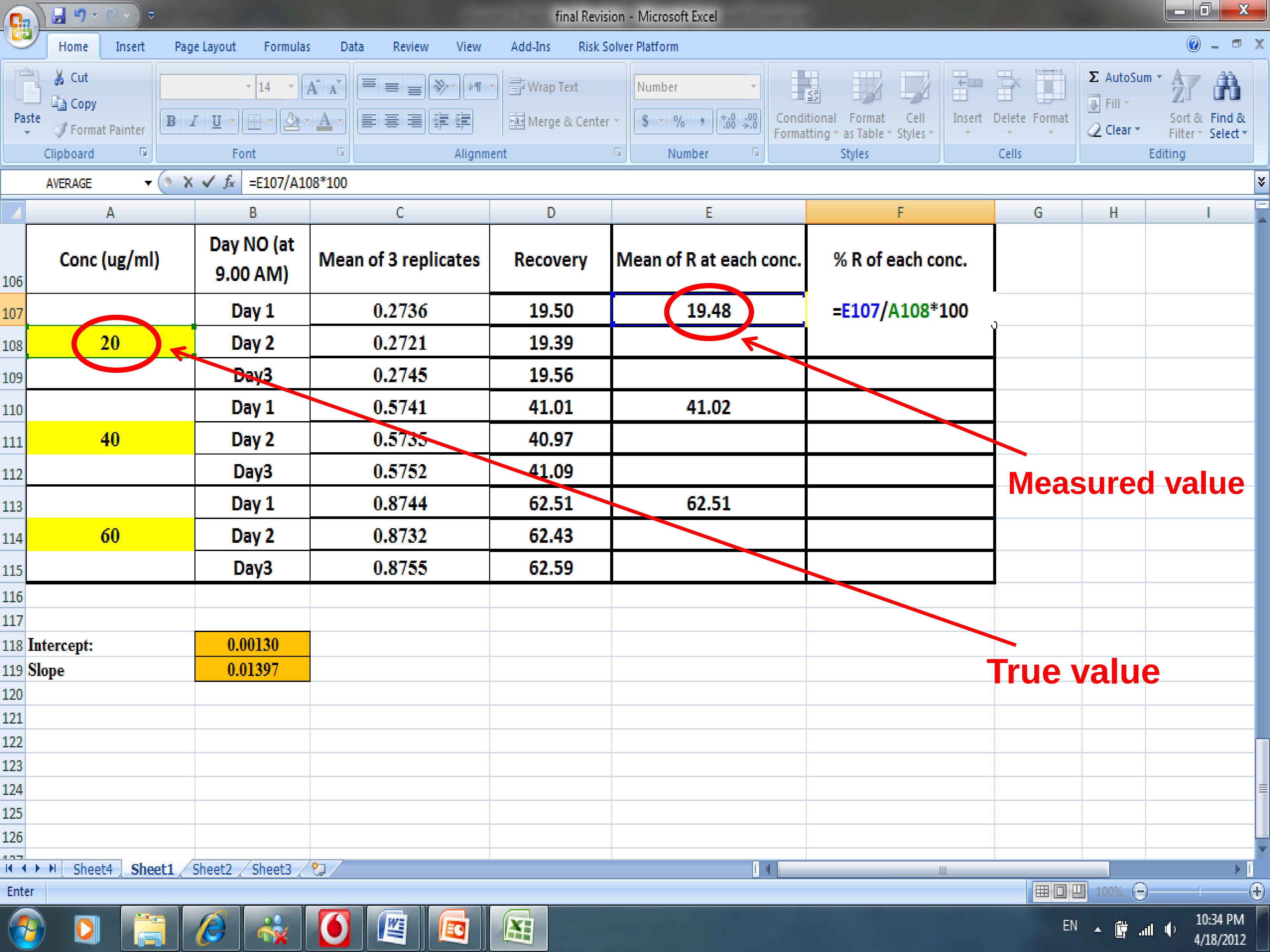
Intercept:	0.00130
Slope	0.01397

How to calculate precision?

- If the specified range is 10 – 70 µg/ml, then we can choose 3 concentration levels; close to the quantitation limit (20 µg/ml) , one in the middle of the range (40 µg/ml) and one at the high end of the calibration curve (60 µg/ml). Then;

4 – % Recovery of each concentration is then calculated.

% R = Measured value / True value *100



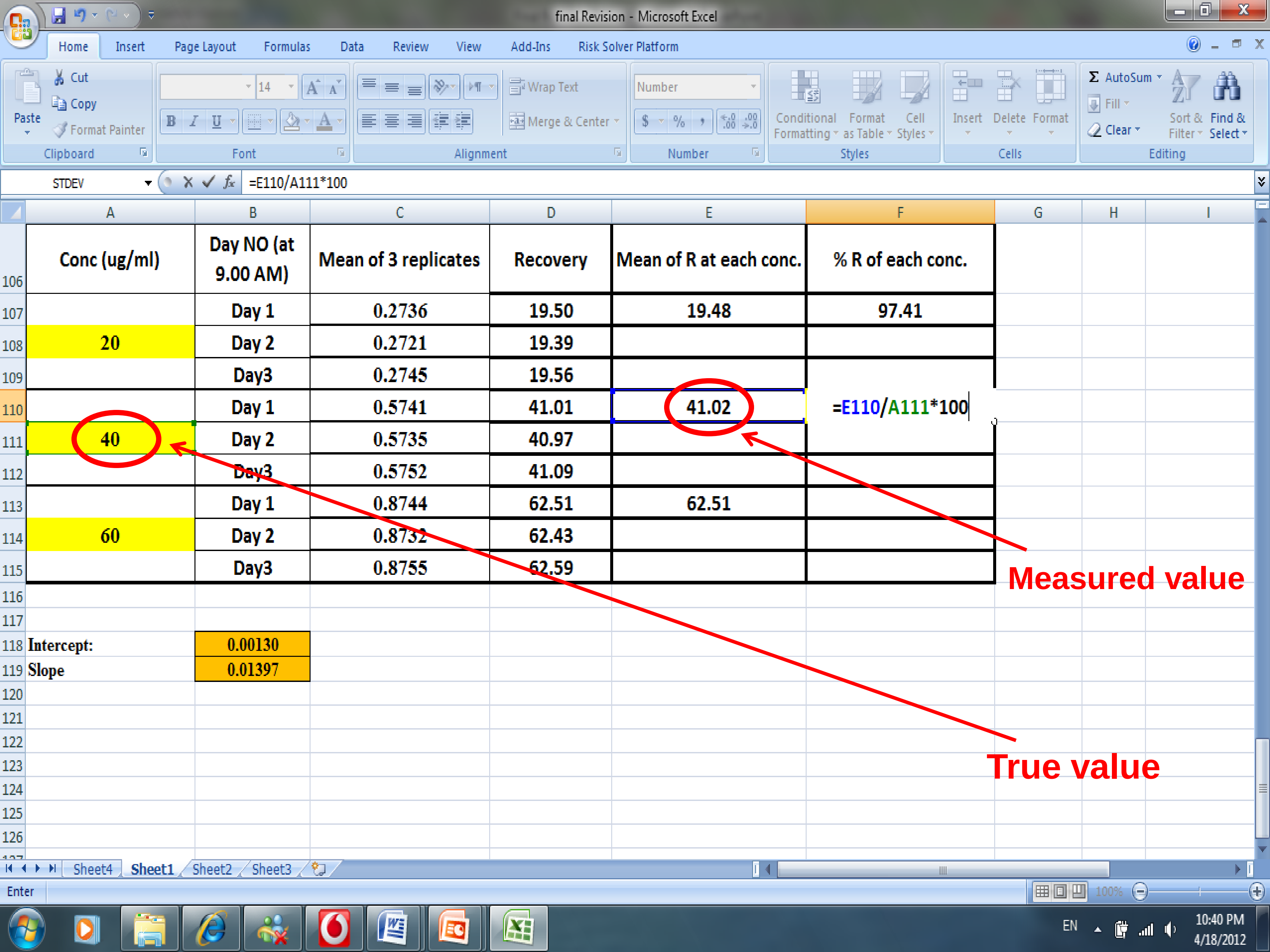
=E107/A108*100

Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery	Mean of R at each conc.	% R of each conc.
	Day 1	0.2736	19.50	19.48	=E107/A108*100
20	Day 2	0.2721	19.39		
	Day3	0.2745	19.56		
	Day 1	0.5741	41.01	41.02	
40	Day 2	0.5735	40.97		
	Day3	0.5752	41.09		
	Day 1	0.8744	62.51	62.51	
60	Day 2	0.8732	62.43		
	Day3	0.8755	62.59		

Intercept:	0.00130
Slope	0.01397

Measured value

True value



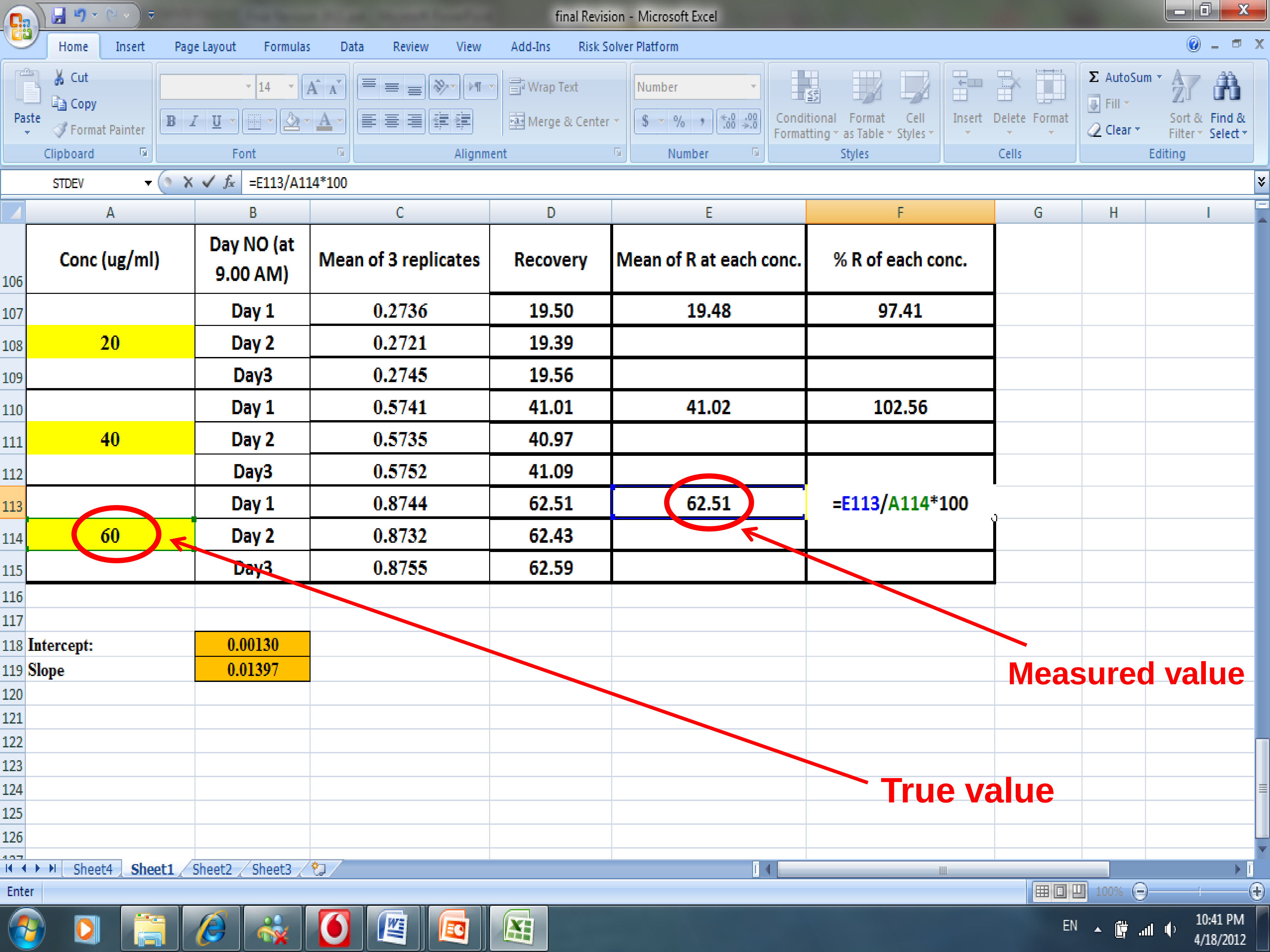
=E110/A111*100

	Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery	Mean of R at each conc.	% R of each conc.
107		Day 1	0.2736	19.50	19.48	97.41
108	20	Day 2	0.2721	19.39		
109		Day3	0.2745	19.56		
110		Day 1	0.5741	41.01	41.02	=E110/A111*100
111	40	Day 2	0.5735	40.97		
112		Day3	0.5752	41.09		
113		Day 1	0.8744	62.51	62.51	
114	60	Day 2	0.8732	62.43		
115		Day3	0.8755	62.59		

118	Intercept:	0.00130
119	Slope	0.01397

Measured value

True value



STDEV

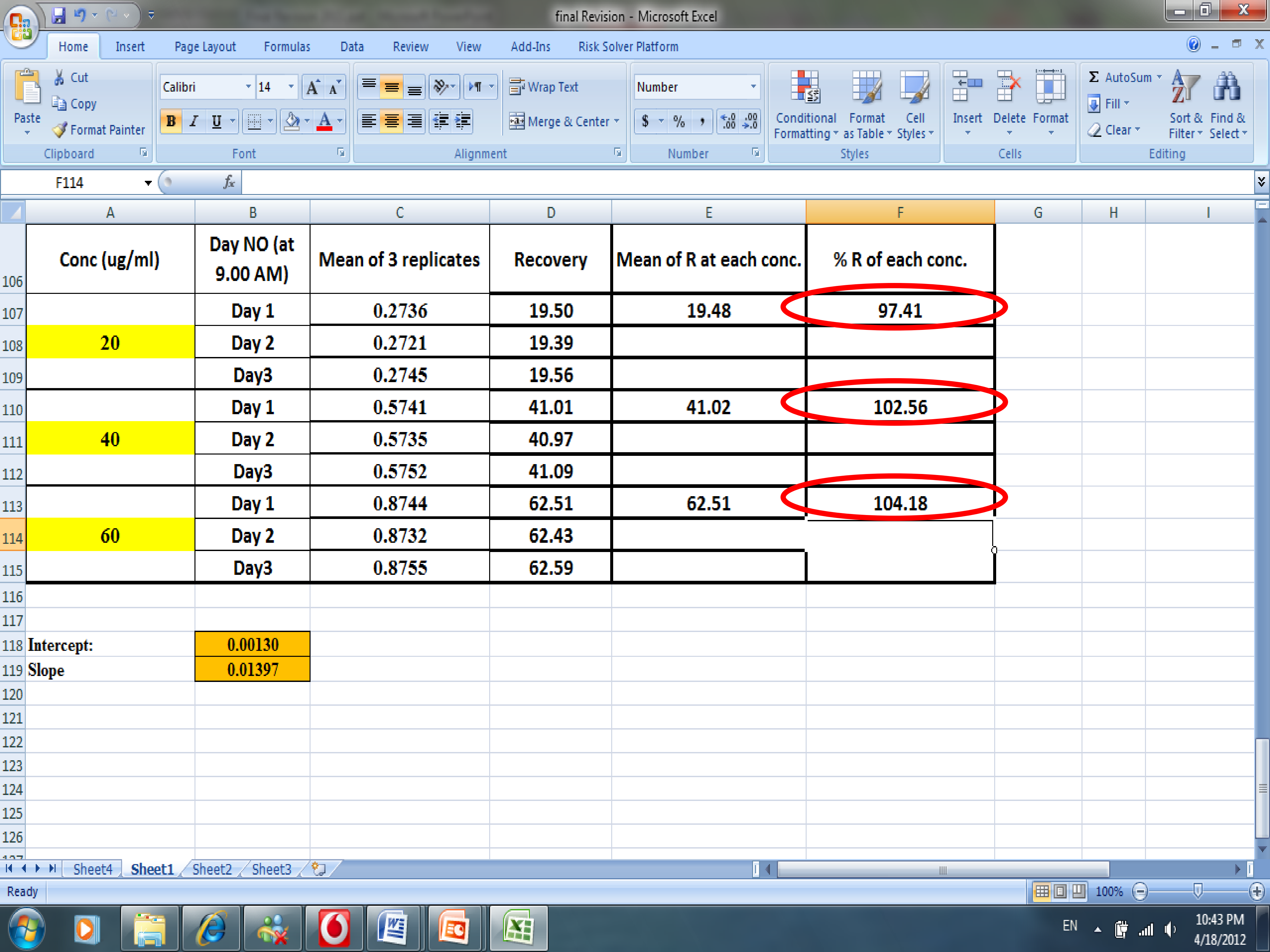
=E113/A114*100

Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery	Mean of R at each conc.	% R of each conc.
	Day 1	0.2736	19.50	19.48	97.41
20	Day 2	0.2721	19.39		
	Day3	0.2745	19.56		
	Day 1	0.5741	41.01	41.02	102.56
40	Day 2	0.5735	40.97		
	Day3	0.5752	41.09		
	Day 1	0.8744	62.51	62.51	=E113/A114*100
60	Day 2	0.8732	62.43		
	Day3	0.8755	62.59		

Intercept:	0.00130
Slope	0.01397

Measured value

True value



Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery	Mean of R at each conc.	% R of each conc.
20	Day 1	0.2736	19.50	19.48	97.41
	Day 2	0.2721	19.39		
	Day3	0.2745	19.56		
40	Day 1	0.5741	41.01	41.02	102.56
	Day 2	0.5735	40.97		
	Day3	0.5752	41.09		
60	Day 1	0.8744	62.51	62.51	104.18
	Day 2	0.8732	62.43		
	Day3	0.8755	62.59		

Intercept:	0.00130
Slope	0.01397

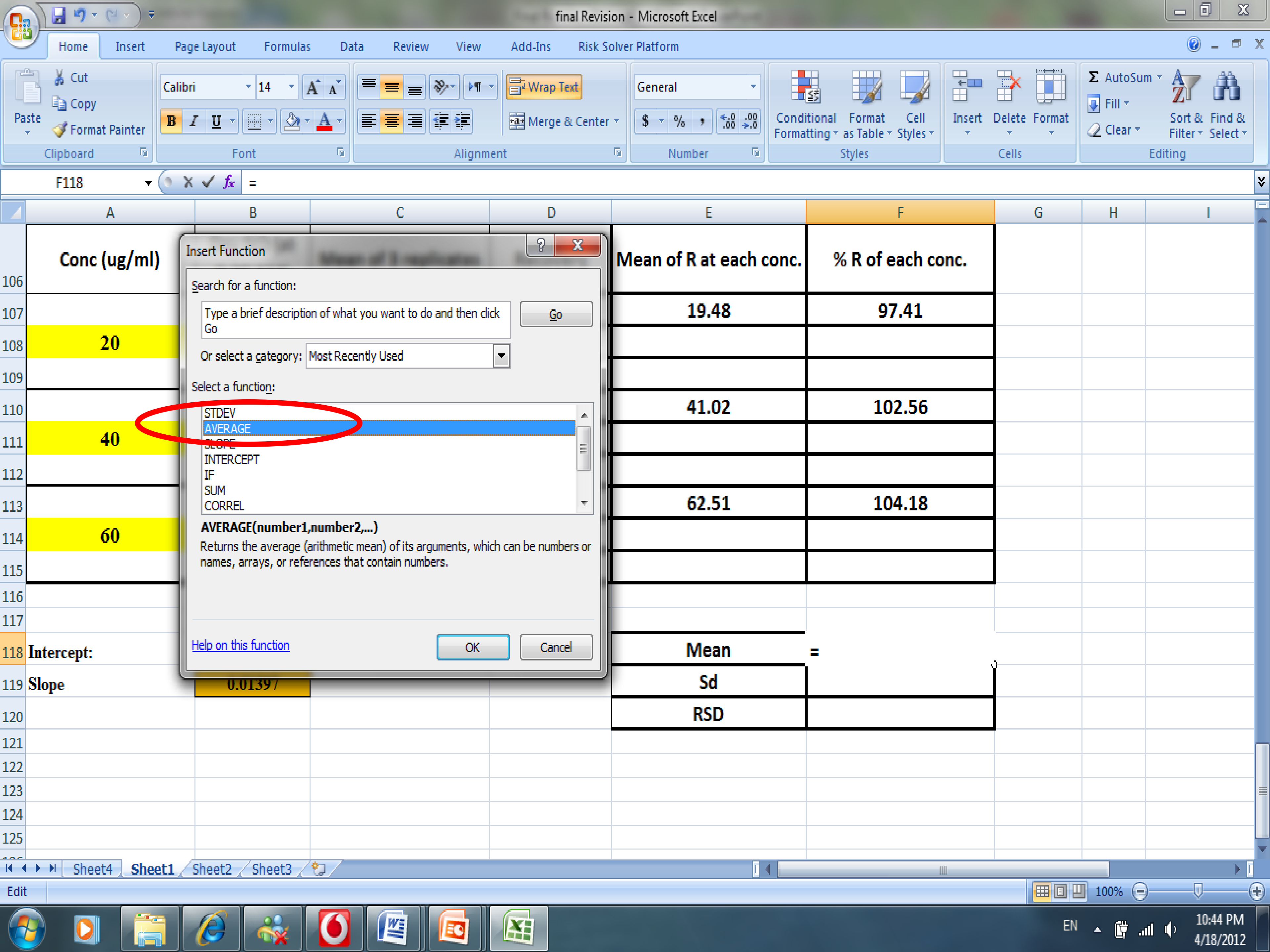
How to calculate precision?

- If the specified range is 10 – 70 µg/ml, then we can choose 3 concentration levels; close to the quantitation limit (20 µg/ml) , one in the middle of the range (40 µg/ml) and one at the high end of the calibration curve (60 µg/ml). Then;

5 – Precision:

RSD = SD/MEAN * 100

N.B.: SD and Mean of % R of the 3 concentrations



=

Insert Function

Search for a function:

Type a brief description of what you want to do and then click Go

Or select a category: Most Recently Used

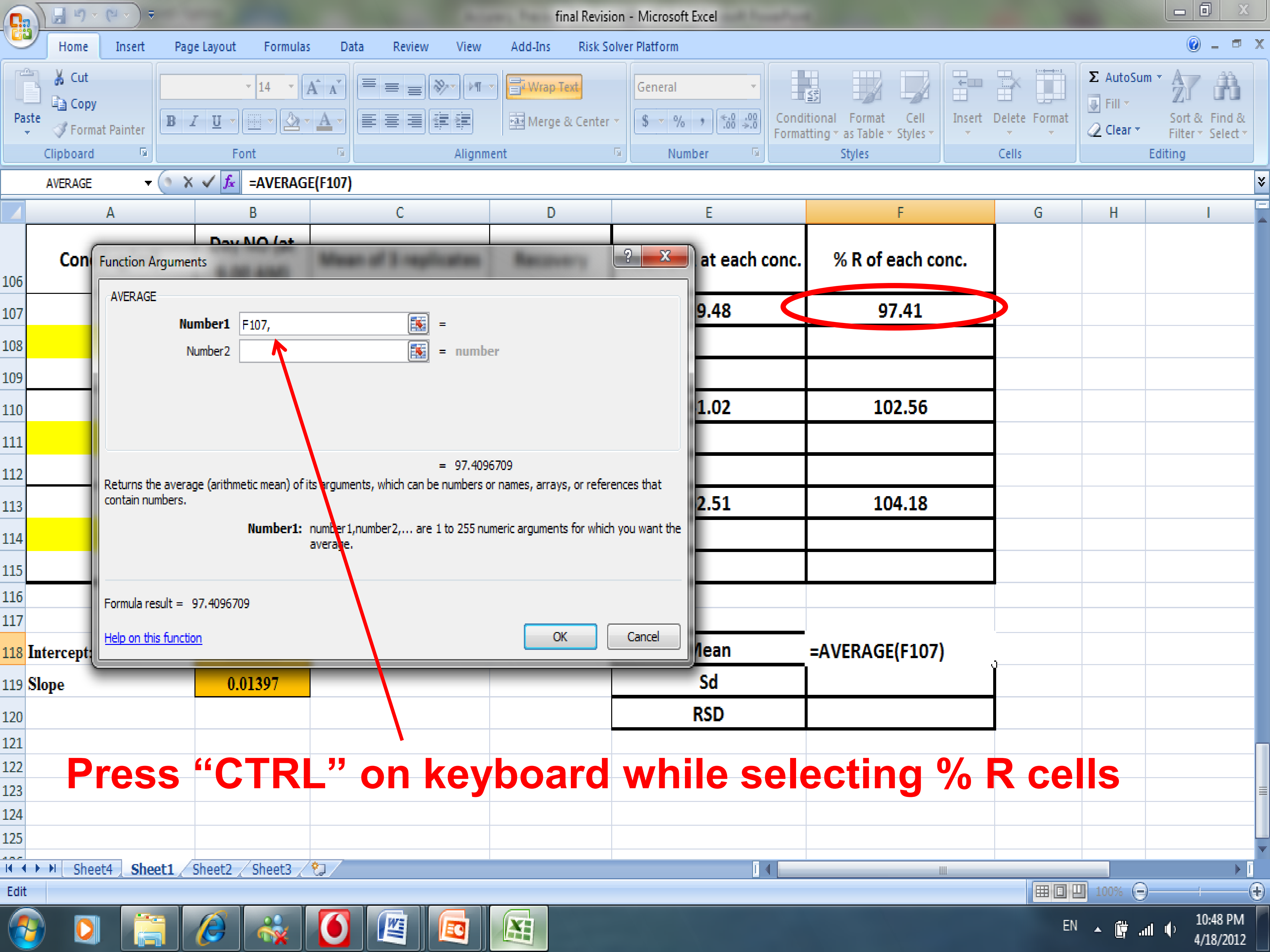
Select a function:

- STDEV
- AVERAGE
- SLOPE
- INTERCEPT
- IF
- SUM
- CORREL

AVERAGE(number1,number2,...)

Returns the average (arithmetic mean) of its arguments, which can be numbers or names, arrays, or references that contain numbers.

	A	B	E	F
106	Conc (ug/ml)		Mean of R at each conc.	% R of each conc.
107			19.48	97.41
108	20			
109				
110			41.02	102.56
111	40			
112				
113			62.51	104.18
114	60			
115				
118	Intercept:		Mean	=
119	Slope	0.01397	Sd	
120			RSD	



AVERAGE =AVERAGE(F107)

Function Arguments

AVERAGE

Number1 F107, =

Number2 = number

= 97.4096709

Returns the average (arithmetic mean) of its arguments, which can be numbers or names, arrays, or references that contain numbers.

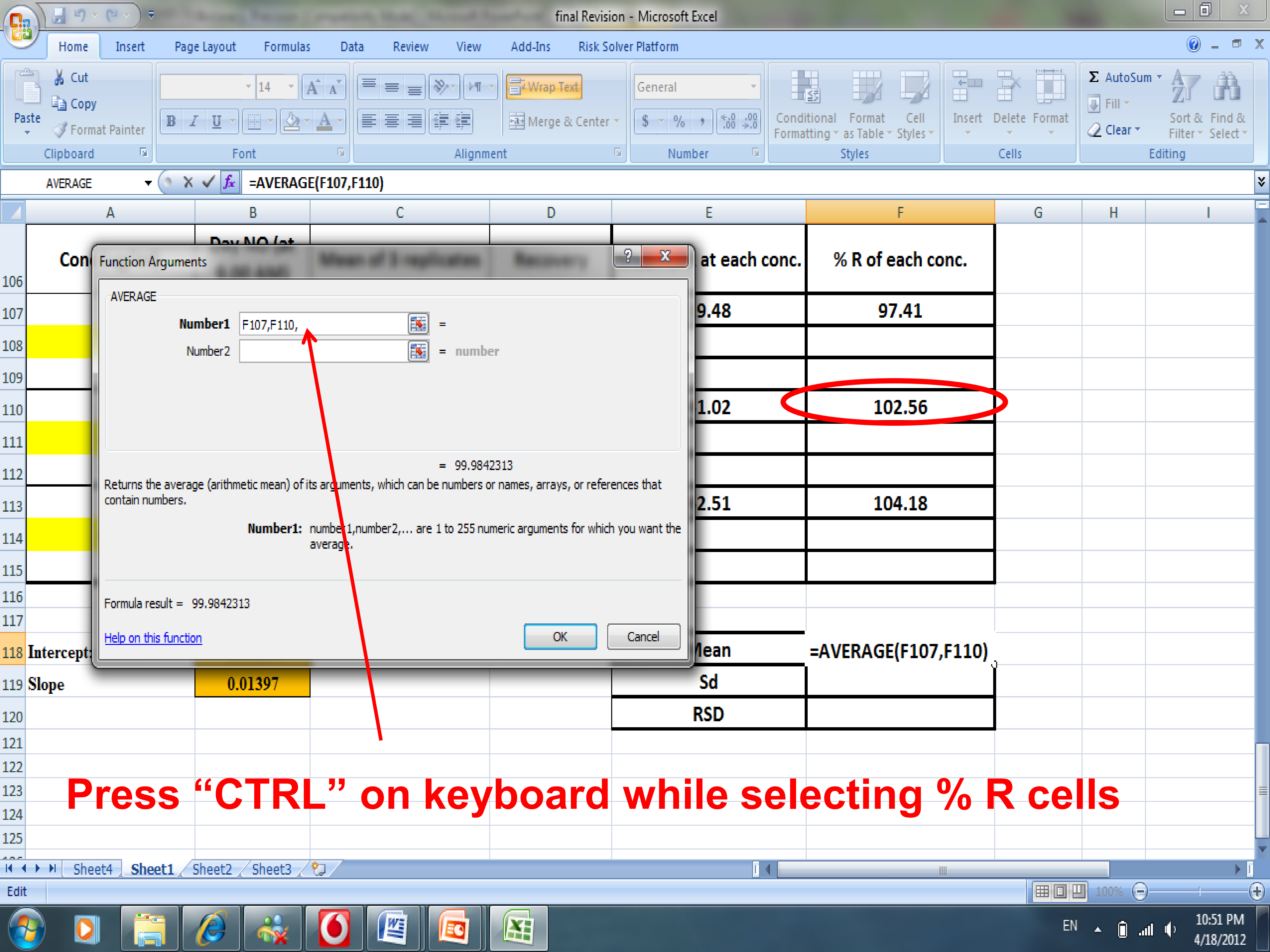
Number1: number1,number2,... are 1 to 255 numeric arguments for which you want the average.

Formula result = 97.4096709

Help on this function

Row	A	B	E	F
106	Con	Day NO (at	at each conc.	% R of each conc.
107			9.48	97.41
110			1.02	102.56
113			2.51	104.18
118	Intercept		Mean	=AVERAGE(F107)
119	Slope	0.01397	Sd	
120			RSD	

Press “CTRL” on keyboard while selecting % R cells



=AVERAGE(F107,F110)

	A	B	C	D	E	F
106	Con	Day NO (at	Mean of 3 replicates	Recovery	at each conc.	% R of each conc.
107					9.48	97.41
110					1.02	102.56
113					2.51	104.18
118	Intercept:				Mean	=AVERAGE(F107,F110)
119	Slope	0.01397			Sd	
120					RSD	

Function Arguments

AVERAGE

Number1 F107,F110, =

Number2 = number

= 99.9842313

Returns the average (arithmetic mean) of its arguments, which can be numbers or names, arrays, or references that contain numbers.

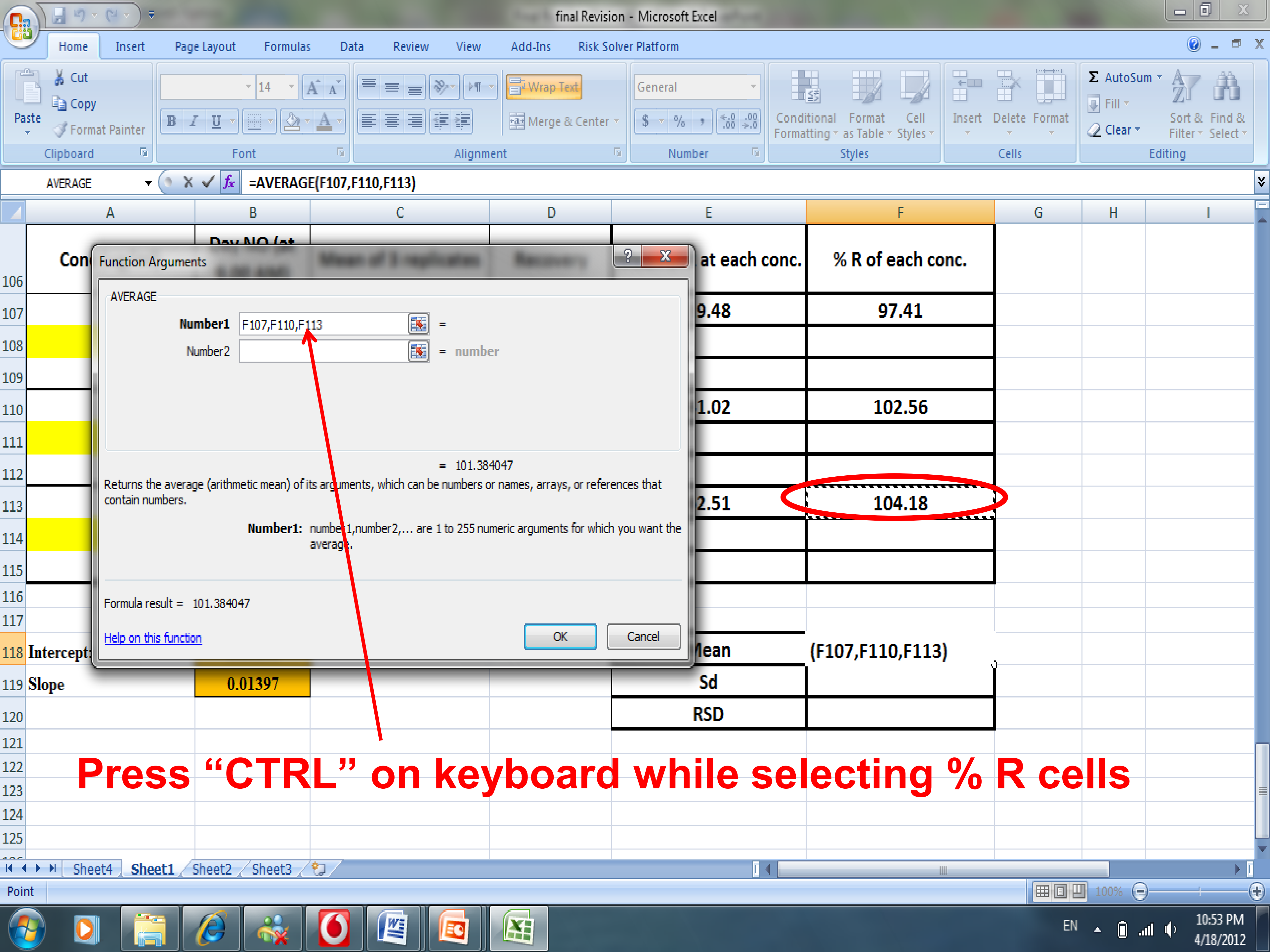
Number1: number1,number2,... are 1 to 255 numeric arguments for which you want the average.

Formula result = 99.9842313

Help on this function

OK Cancel

Press “CTRL” on keyboard while selecting % R cells



=AVERAGE(F107,F110,F113)

Function Arguments

AVERAGE

Number1 F107,F110,F113 =

Number2 = number

= 101.384047

Returns the average (arithmetic mean) of its arguments, which can be numbers or names, arrays, or references that contain numbers.

Number1: number1,number2,... are 1 to 255 numeric arguments for which you want the average.

Formula result = 101.384047

Help on this function

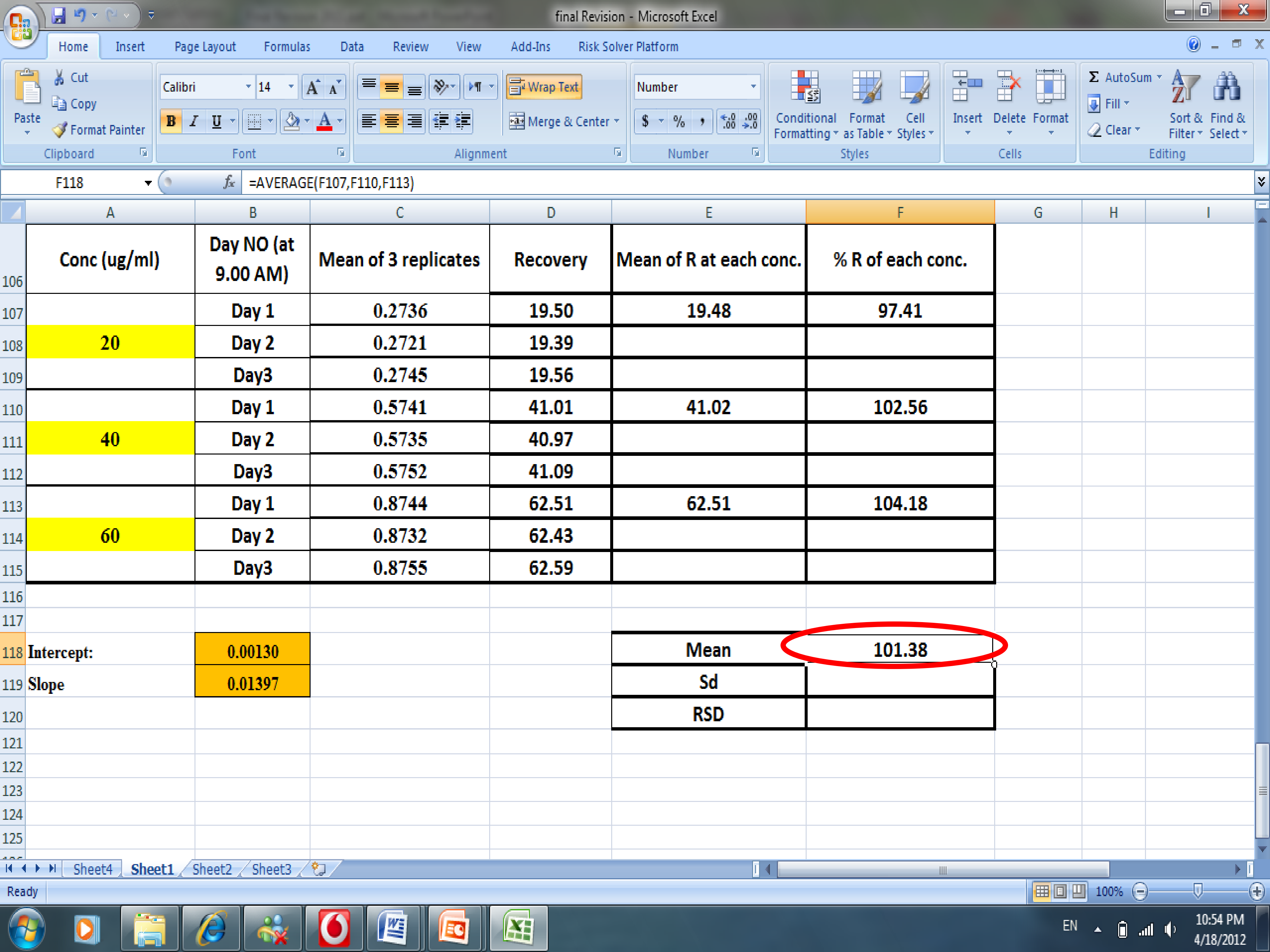
OK Cancel

	% R of each conc.
107	97.41
110	102.56
113	104.18
Mean	(F107,F110,F113)
Sd	
RSD	

Intercept

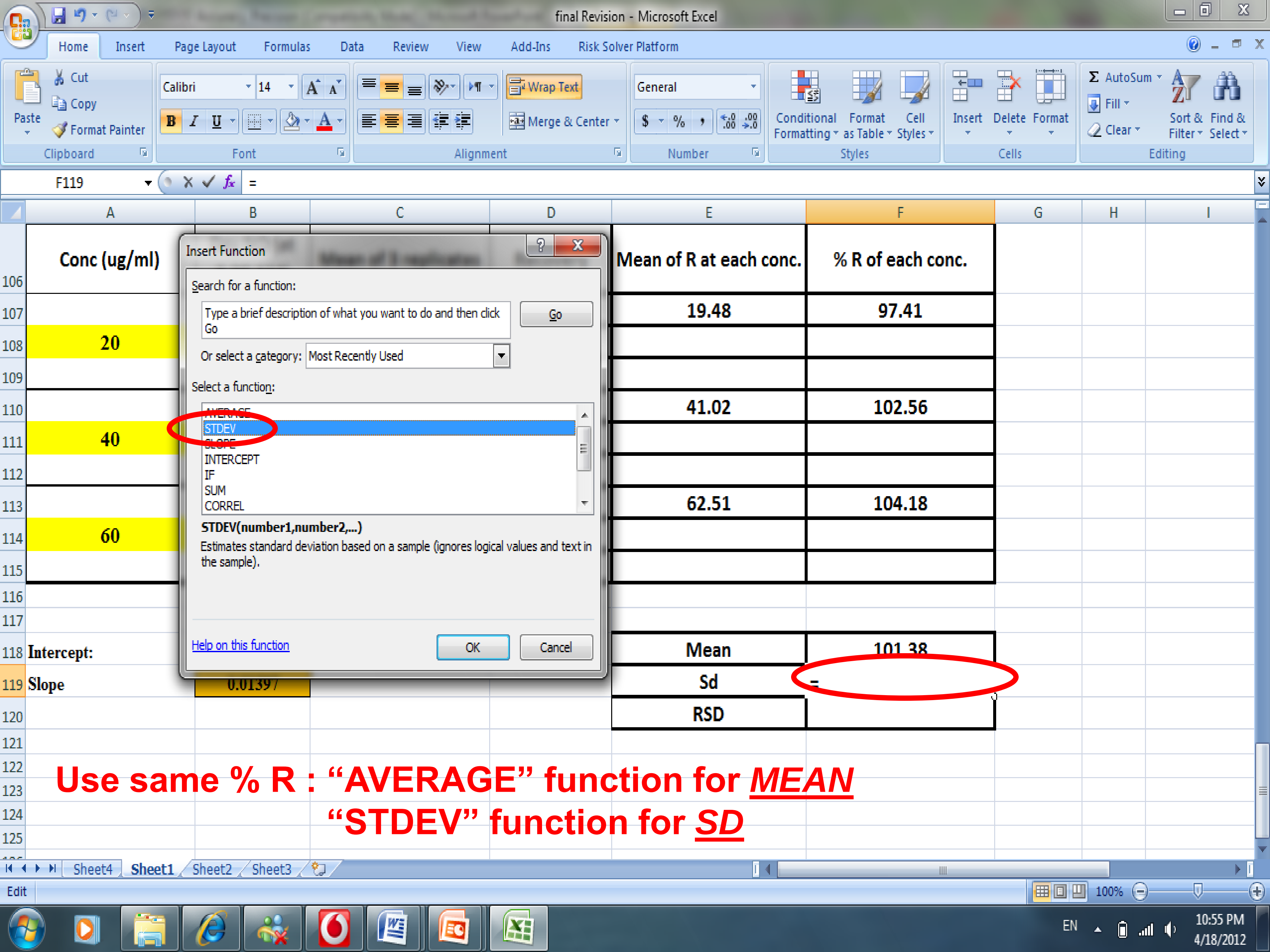
Slope 0.01397

Press "CTRL" on keyboard while selecting % R cells



F118 =AVERAGE(F107,F110,F113)

	A	B	C	D	E	F
106	Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery	Mean of R at each conc.	% R of each conc.
107		Day 1	0.2736	19.50	19.48	97.41
108	20	Day 2	0.2721	19.39		
109		Day3	0.2745	19.56		
110		Day 1	0.5741	41.01	41.02	102.56
111	40	Day 2	0.5735	40.97		
112		Day3	0.5752	41.09		
113		Day 1	0.8744	62.51	62.51	104.18
114	60	Day 2	0.8732	62.43		
115		Day3	0.8755	62.59		
116						
117						
118	Intercept:	0.00130			Mean	101.38
119	Slope	0.01397			Sd	
120					RSD	



F119 =

	A	B	E	F
106	Conc (ug/ml)		Mean of R at each conc.	% R of each conc.
107			19.48	97.41
108	20			
109				
110			41.02	102.56
111	40			
112				
113			62.51	104.18
114	60			
115				
118	Intercept:		Mean	101.38
119	Slope	0.01397	Sd	=
120			RSD	

Insert Function

Search for a function:

Type a brief description of what you want to do and then click Go

Go

Or select a category: Most Recently Used

Select a function:

- AVERAGE
- STDEV
- SLOPE
- INTERCEPT
- IF
- SUM
- CORREL

STDEV(number1,number2,...)

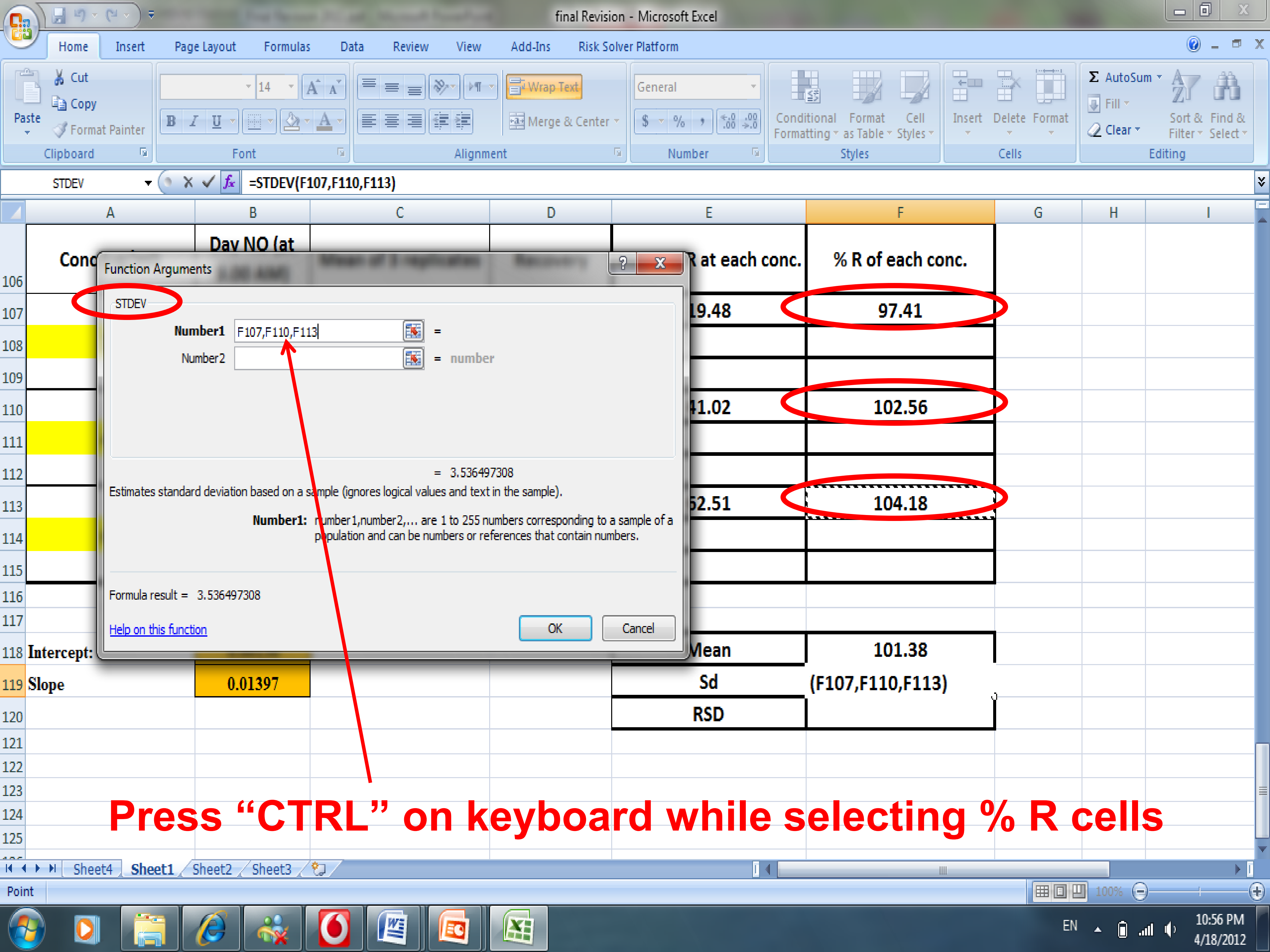
Estimates standard deviation based on a sample (ignores logical values and text in the sample).

Help on this function

OK Cancel

Use same % R : "AVERAGE" function for *MEAN*

"STDEV" function for *SD*



STDEV =STDEV(F107,F110,F113)

Function Arguments

STDEV

Number1 F107,F110,F113 =

Number2 = number

= 3.536497308

Estimates standard deviation based on a sample (ignores logical values and text in the sample).

Number1: number1,number2,... are 1 to 255 numbers corresponding to a sample of a population and can be numbers or references that contain numbers.

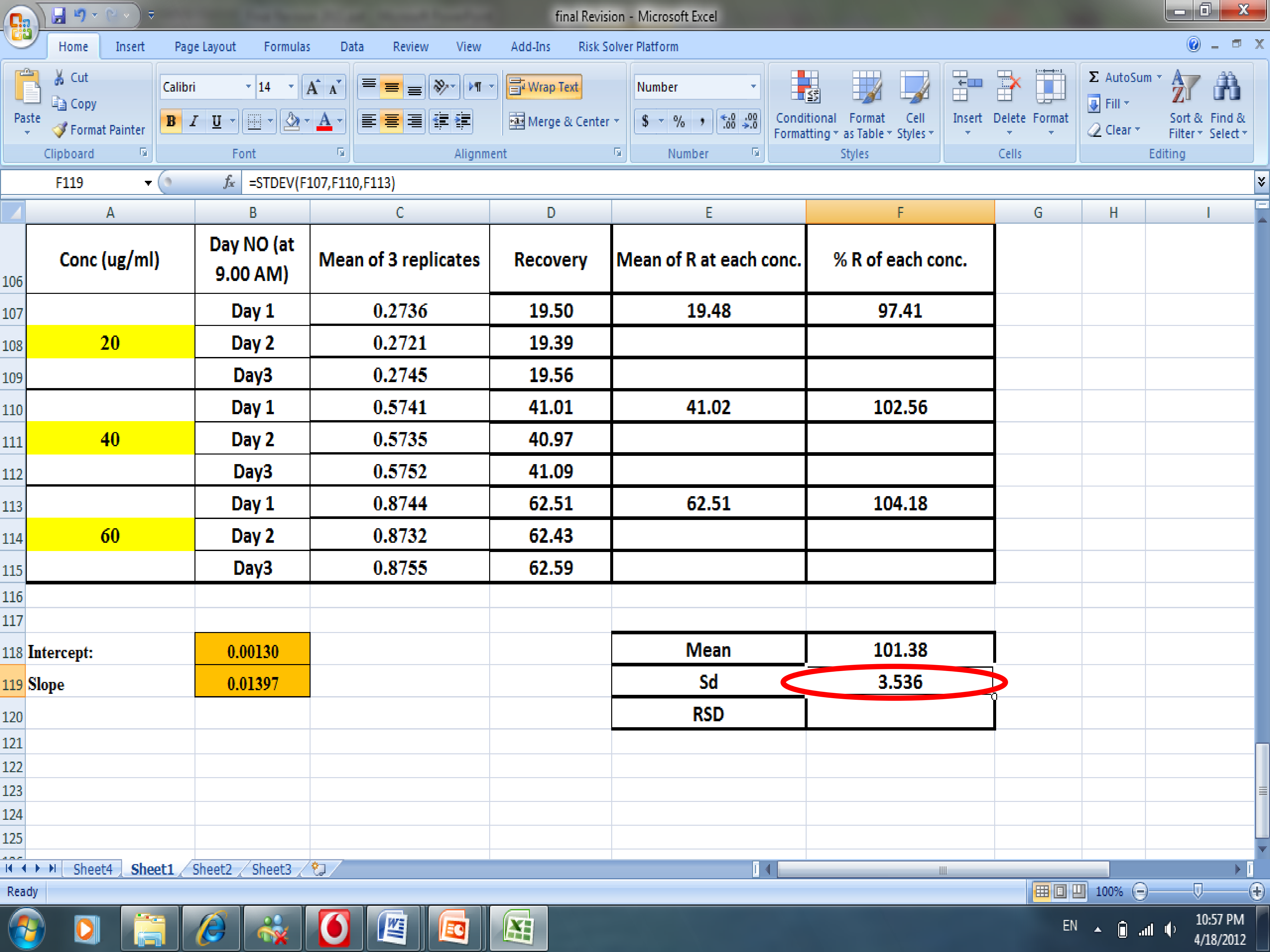
Formula result = 3.536497308

Help on this function

	A	B	E	F
106	Conc	Day NO (at	R at each conc.	% R of each conc.
107			19.48	97.41
110			41.02	102.56
113			52.51	104.18
118	Intercept:		Mean	101.38
119	Slope	0.01397	Sd	(F107,F110,F113)
120			RSD	

Press “CTRL” on keyboard while selecting % R cells

10:56 PM
4/18/2012

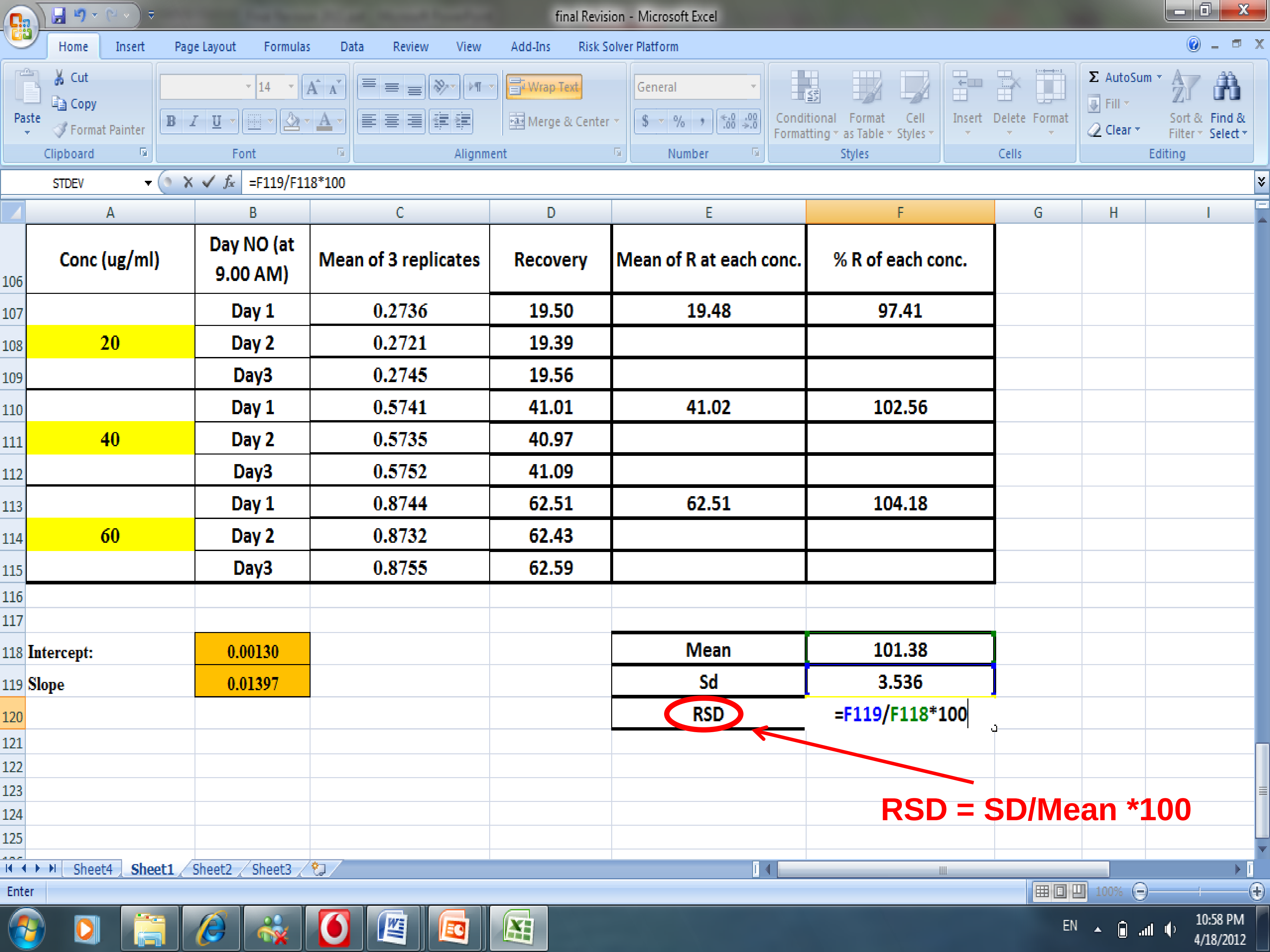


F119 =STDEV(F107,F110,F113)

Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery	Mean of R at each conc.	% R of each conc.
20	Day 1	0.2736	19.50	19.48	97.41
	Day 2	0.2721	19.39		
	Day3	0.2745	19.56		
40	Day 1	0.5741	41.01	41.02	102.56
	Day 2	0.5735	40.97		
	Day3	0.5752	41.09		
60	Day 1	0.8744	62.51	62.51	104.18
	Day 2	0.8732	62.43		
	Day3	0.8755	62.59		

Intercept:	0.00130
Slope	0.01397

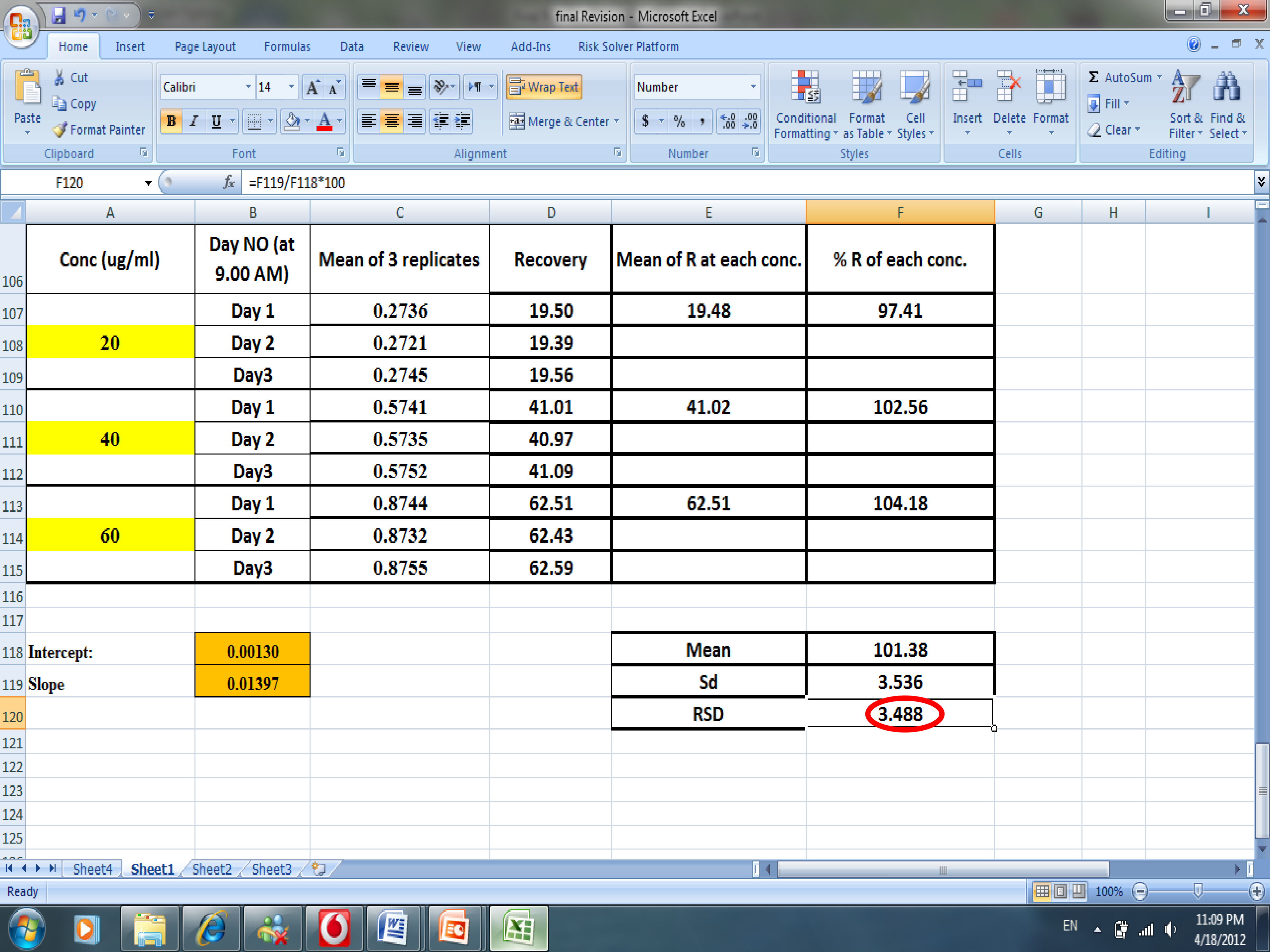
Mean	101.38
Sd	3.536
RSD	



STDEV =F119/F118*100

	A	B	C	D	E	F
106	Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery	Mean of R at each conc.	% R of each conc.
107		Day 1	0.2736	19.50	19.48	97.41
108	20	Day 2	0.2721	19.39		
109		Day3	0.2745	19.56		
110		Day 1	0.5741	41.01	41.02	102.56
111	40	Day 2	0.5735	40.97		
112		Day3	0.5752	41.09		
113		Day 1	0.8744	62.51	62.51	104.18
114	60	Day 2	0.8732	62.43		
115		Day3	0.8755	62.59		
116						
117						
118	Intercept:	0.00130			Mean	101.38
119	Slope	0.01397			Sd	3.536
120					RSD	=F119/F118*100

RSD = SD/Mean *100

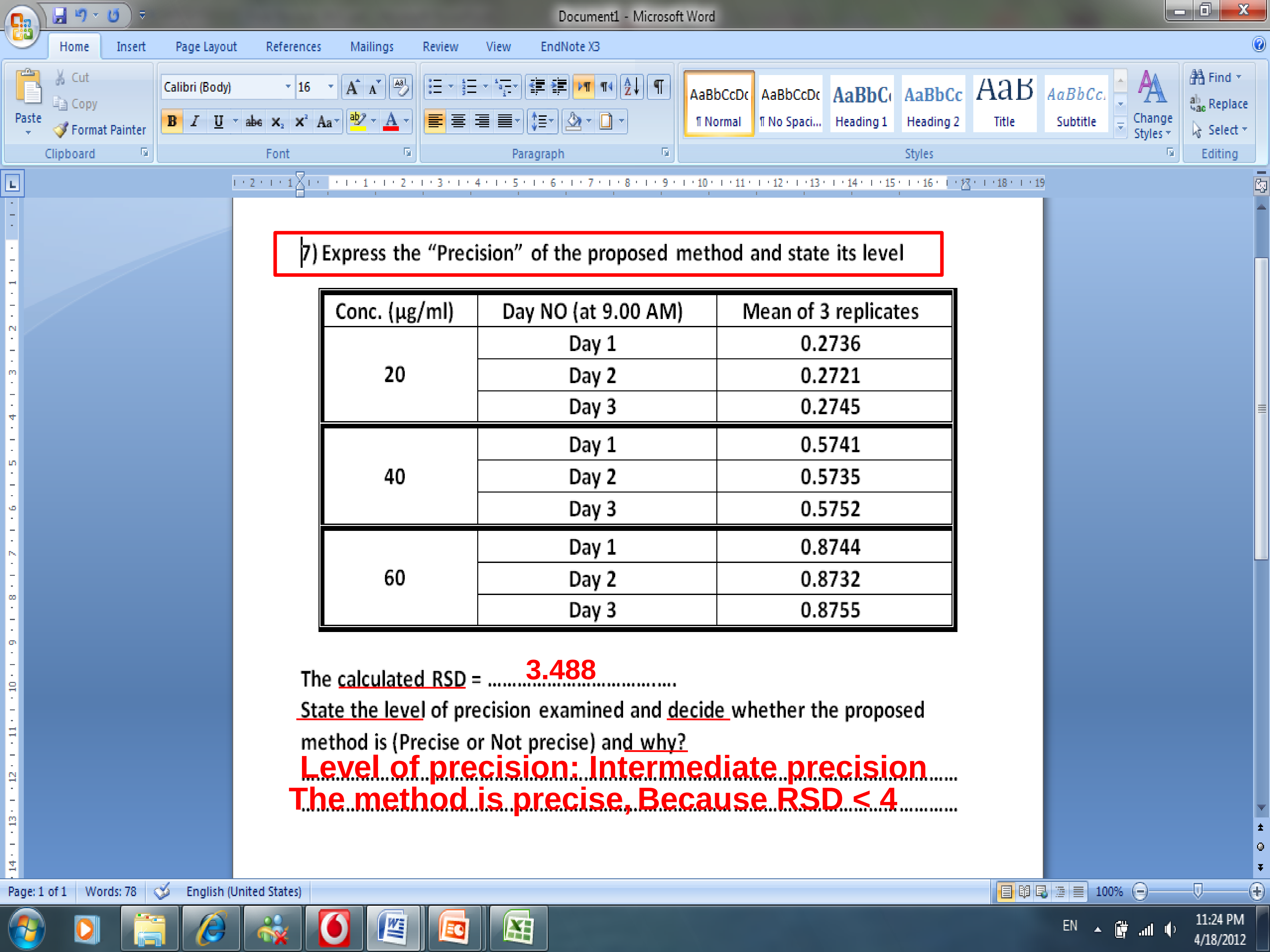


F120 =F119/F118*100

Conc (ug/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates	Recovery	Mean of R at each conc.	% R of each conc.
20	Day 1	0.2736	19.50	19.48	97.41
	Day 2	0.2721	19.39		
	Day3	0.2745	19.56		
40	Day 1	0.5741	41.01	41.02	102.56
	Day 2	0.5735	40.97		
	Day3	0.5752	41.09		
60	Day 1	0.8744	62.51	62.51	104.18
	Day 2	0.8732	62.43		
	Day3	0.8755	62.59		

Intercept:	0.00130
Slope	0.01397

Mean	101.38
Sd	3.536
RSD	3.488



7) Express the "Precision" of the proposed method and state its level

Conc. (µg/ml)	Day NO (at 9.00 AM)	Mean of 3 replicates
20	Day 1	0.2736
	Day 2	0.2721
	Day 3	0.2745
40	Day 1	0.5741
	Day 2	0.5735
	Day 3	0.5752
60	Day 1	0.8744
	Day 2	0.8732
	Day 3	0.8755

The calculated RSD = ...3.488.................................

State the level of precision examined and decide whether the proposed method is (Precise or Not precise) and why?

Level of precision: Intermediate precision.......

The method is precise, Because RSD < 4..........

GOOD LUCK